AUTOMOTIVE INDUSTRIES
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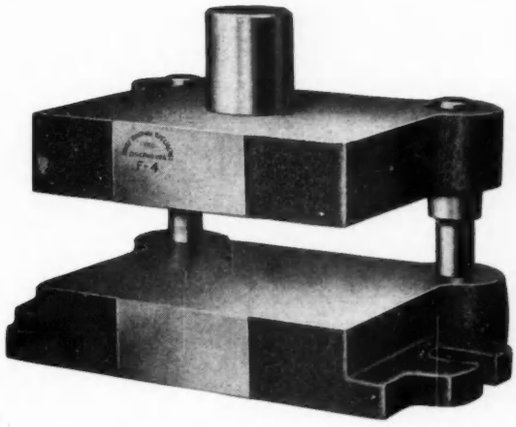

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In The Automotive Industry

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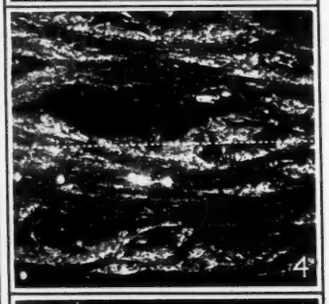

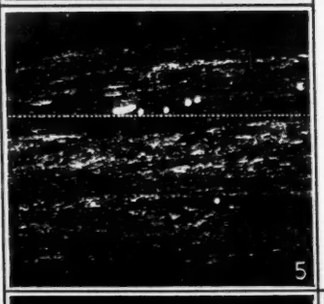

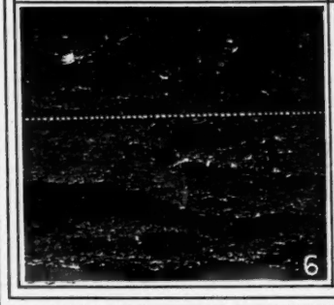

The group of samples of moulded brake linings shown in the panel at the bottom of the page was given the standard heat test (600° F. for three hours). Notice the difference in surface appearance. The sample at the left is Multibestos LX.

Then a cross-sectional photograph was taken of each with the same degree of magnification. These samples were all purchased in the open market and tested impartially under strict laboratory conditions. Note how some were swollen beyond the limits of the photograph. Distance between edge and dotted line shows original thickness of lining. The round white spots are wire, showing the presence of scrap material. The large craters show rupture of lining due to failure of binding material. The Multibestos sample No. 7 shows perfect results—practically no swelling—perfect structure—no break down of the binding material. We invite a similar test by anyone, or will be glad to show the original samples to any automotive manufacturer. Multibestos Company, Walpole, Mass.

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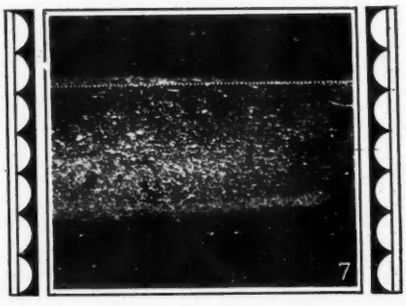

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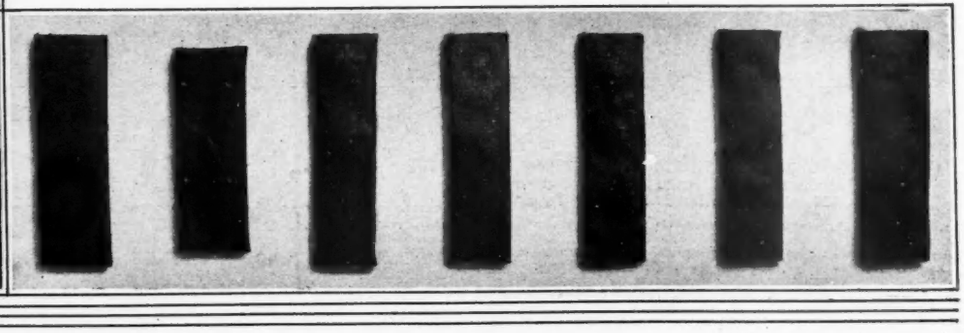

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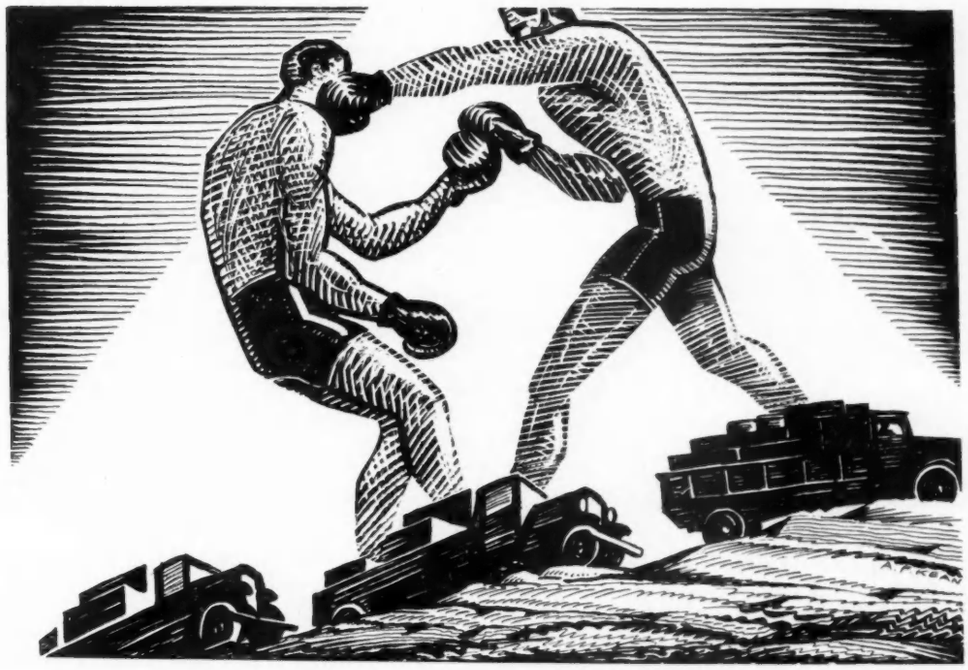


Truck Industry Fights Onslaught of Depression

Drop in export business was big disappointment during first six months - - - - -

Light-duty commercial cars making best showing, heavy units showing recession - -

By George T. Hook

Editor, Commercial Car Journal
and Operation & Maintenance

DURING the early rounds of this year the truck industry made a valiant showing against the business depression. It stood up like a veteran against the terrific left and right hooks, uppercuts and haymakers that sent other industries into a corner battered and gasping for breath. It side-stepped with amazing agility blows that almost knocked out some other industries.

The salvo of applause that arose from the interested spectators were cheery and sincere. Even we so-called experts drove our frenzied typewriters into a state of squeaks typing out the gladsome tidings.

But we weren't kidding ourselves. We were merely being opportunists; yelling while the yelling was good. After all, nobody knows better than your so-called expert that when a business depression really hits its stride it begins to resort to foul tactics, and there's no industry that can take a decision in the face of rabbit punches, knees into the abdomen, thumb pokes into the eye and even flying mares.

So, when the March, April, May and June rounds were fought, the course of the battle which statisticians plotted showed that in the first six rounds of the year the depression had fouled the truck business for a 12 per cent loss in domestic sales as compared with the same period of 1929; a loss of 31 per cent in export sales, and a 26 per cent loss in production, as compared with those months last year.

Now, while this in itself isn't anything to write home about, it is noteworthy that while the industry at the moment is slightly winded and bruised, it isn't groggily hanging on the ropes. It is, judging by advices from factory and field, very much alive to its position, and sparring for an opening which some of the experts feel confident will come this autumn.

If it does, then the industry should battle depression

to a standstill in the second half of this year's struggle and come out at the end of the year with honorable scars, which might easily have been worse, considering the epic nature of the joust.

Of course, the foregoing observations apply to the truck industry as a whole. But the truck business, as some factory executives will frequently remind you, is made up of businesses. There is, for instance, the light-duty truck business and the medium and heavy-duty truck business. The former is preponderantly represented by the champion lightweights Ford and Chevrolet. The other classes are ably championed by all other manufacturers.

Small Trucks Showed Well

If this division of interest is applied to the results sustained in the first half of this year, there is a significant disparity in the punishment absorbed by each. The truth is that the lightweights stood the gaff in the first half of the 1930 domestic bout while the so-called heavyweights wilted and wound up the first period looking, as the sports writers say, merely the hulks of their former selves. In plain figures, Ford and Chevrolet in the first six months sold an estimated total of 174,000 units domestically, which was 7.4 per cent under 1929 but 111 per cent above 1928. All the other manufacturers, however, sold approximately 56,000 units, which was 23 per cent under 1929 and 17.6 per cent under 1928.

In fact, this total of 56,000 was even under the 1926 and 1927 totals. Which is unquestionable proof, if you want any, that as a whole makers other than Ford and Chevrolet have so far this year taken what may be termed a severe lacing. The table at the bottom of this page, giving five-year first-half comparisons, tells the story in a few figures.

Now, while the domestic truck market as a whole was set back in the first half of this year as compared with 1929, the national sales map was not without some pins from whose tops floated blue ribbons. There were, in fact, 18 states that registered sales gains. Following is the honor roll: Maine, New Hampshire, Maryland, Virginia, West Virginia, Florida, Wisconsin, Kentucky, Tennessee, Alabama, Mississippi, Minnesota, Missouri, South Dakota, Idaho, Wyoming, Colorado and Utah.

The most heart-rending disappointment thus far in 1930 has been the export market for trucks. Before last October administered an opiate to general business, the leaders in the truck industry were getting blisters on their hands from rubbing them in happy anticipation of what the export market had in store. The foreign field, at that time, was considered a push-over for commercial vehicles, not only because prices were right, but because in mehcanical design and in appearance the American products put their foreign competitors far in the shade, and because most companies had spent considerable time, effort and money in the building of satisfactory dealer representation abroad. The eggs were all ready but the depression got to them before the hen and instead of life gave us the makings of an egg-nog in which to drown our disappointment.

So that instead of a skyrocket, truck exports in the first half of this year proved to be a squib that hissed out a 31 per cent flop from the 1929 record of 188,288 units. And since this 188,288 total represented a gain of 127 per cent over the total for the first half of 1928, the importance attained by the export market needs no emphasis.

Exports Ahead of 1928

It is true, of course, that exports for the first half of this year are still 57 per cent better than for the same period of 1928. This is a fragrant rose to sniff at but there's a bee hidden among the petals. During the early months of 1928 Ford was still groping about with the Model A and Model AA. Mighty few Ford commercial vehicles took ocean cruises in those months. In the first half of this year, however, Ford's vigor is not to be questioned and the bulk of the 130,000 units exported must be attributed to Ford and Chevrolet. This leaves the rest of the industry with a small bag holding about the same amount of exports as in 1928. Perhaps just slightly more, but certainly far from a 57 per cent increase.

This is a drab picture of the export market but the pigments are natural and not dulled by personal opinions. The industry's leaders admit the export market is not what it was to have been. Nor is the vista of the next six months a very enthralling one. The latest

Domestic and Foreign Sales and Production Comparisons for First Six Months of Five Years

Domestic Sales	1926	1927	1928	1929	1930 (Estimated)	Per Cent Loss 1930 Over 1929	Per Cent Gain 1930 Over 1928
Ford and Chevrolet	129,464	125,029	82,526	188,704	174,000	7.4	111.0
All Other Makers	69,995	63,111	68,182	74,294	56,000	23.0	—17.6
Total Domestic Sales	199,459	188,140	150,708	262,998	230,000	12.2	52.6
American Foreign Sales	82,249	98,463	82,821	188,288	130,000	30.8	57.0
Total Domestic and Foreign Sales	281,708	286,603	233,529	451,286	360,000	20.0	54.0
Production, U. S. and Canada	294,376	297,269	256,187	488,261	362,000	25.8	41.3

reports of the Department of Commerce show that the world depression continues, with only a few countries revealing signs of partial improvement.

So far as the next six months are concerned, the domestic truck market wears a more silvery lining than the export market. But its brilliance is not likely to be as dazzling as the same period of last year. In fact the high officials of factories seem to be fairly agreed that the second half of this year will compare with the second half of 1929 in the same ratio as the first half compared with the first half of 1929.

Expect 12 Per Cent Drop

This expectation, if realized, would mean a drop in sales of 12 per cent for the second half, which would enable the industry to show a similar percentage decrease for the entire year. That is, domestic sales for 1930 would be 12 per cent under the 1929 total. And if you'll just take the trouble to look around at other industries and see the maimed, the halt and the blind, you'll agree that a drop of only 12 per cent in a badly bent year like 1930 would be a masterly achievement.

After studying the past six months for facts that might throw kindly light on future prospects, Walter S. Graves, Dodge truck sales manager, made the following pertinent observation: "It is a noteworthy fact that volume during the first half of the year has come largely from individual accounts rather than from fleet operators. Individual accounts should continue to produce business in undiminished quantities while at the same time it is logical to assume that fleet owners will of necessity begin to buy during the last half of the year to maintain the standard of their service to the public."

This is a reasonable expectation but exactly when the fruit will be ready for plucking is another matter. The testimony of economists is a bit confusing when the future prospects of American business are under observation. Some economists see the bottom of the down-swing reached, and take this for an encouraging sign. Doubtless on the premise that a pendulum can go only so far on the downward swing and thereafter must go up. Which is similar to the reasoning that a dog can run into the woods only half way; thereafter he is running *out*.

This logic meets with some embarrassment when one counters that a pendulum may rest a long time at the bottom of its swing if the clock runs down, and a dog may lose his way in the forest and be a long time finding his way out. But business has not completely run down nor has it gone wholly to the dogs, so the logic may be considered in good standing. Still other economists perceive a tendency to even lower commodity prices. But no matter where the economists place the pendulum of business they all seem to be agreed that the dog will be in the woods all summer and won't be on his way out until fall.

Factory executives also seem to be of the opinion that autumn will not only bring a fall of leaves but also a fall of orders into dealers' laps, not, however, without the exertion of some effort on the part of the dealers.

"Anticipate steady truck sales during last half on par or better than first half," wired H. C. Keenan, vice-president, Sterling Motor Truck Co., to the writer. "Believe bottom of buying slump has been reached and demand will reach normal trend by fall."

"Registration Willys-Overland commercial vehicles 39 per cent ahead of last year," telegraphed L. A. Miller, president of Willys-Overland. "We feel opportunities for truck business splendid in last half 1930 and feel confident truck sales will at least equal and probably exceed first half of 1930."

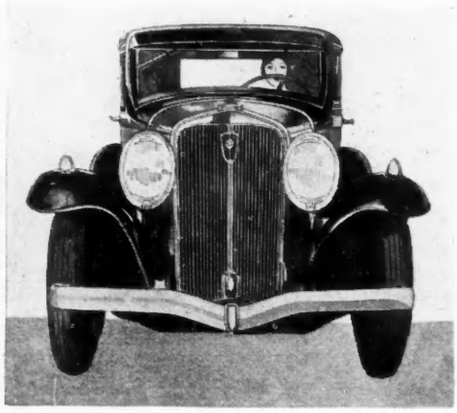
"From every indication," came the word from Albert Staab, sales manager, LeBlond-Schacht Truck Co., "we believe the last half of 1930 will compare very favorably with the first half in sales volume. We have recently made a survey among our branches and dealers, and they all report the outlook for future business encouraging."

M. L. Pulcher, president of Federal Motor Truck Co., wrote: "Our business for the first six months was fairly good. We have no complaint whatsoever to offer, and we are looking forward to a better six months."

Mr. Graves, truck sales manager of Dodge Bros. Corp., wired the following: "I feel safe saying that volume truck business for balance of this year will retain at least as favorable ratio toward business for same period of a year ago as it has during first six months."

Speaking for Brockway - Indiana, Martin A. O'Mara, president of that organization, declared: "Brockway - Indiana sales and deliveries for the first half of 1930 will be about 10 per cent under 1929 in number of units. This despite the fact that we have a drop of approximately 51 per cent in our export sales in countries throughout the world, which represented a very substantial part of our business prior to this time."

Dealers cannot expect orders to fall in their laps unless they do a difficult sales job - - -



Front of the new President and Commander models, showing striking radiator design - - -

Studebaker Incorporates Transmissions in Both

President and Commander, being shown this week, are first large-production American cars with free-wheeling - -

Carburetor noise-muffler eliminates power-roar - - - - - - - -

Two Presidents and Commander series have longer wheelbases - - - -

Body designs are improved throughout

OUTSTANDING among the features of the new series Studebaker President and Commander Eights, which are being announced to the public this week, is a new transmission combining silent operation in high and intermediate speeds with free-wheeling. This is the first time the free-wheeling feature has ever been offered to American motorists on any large-production car, and the response of the buying public will be watched with interest by the whole industry.

This free-wheeling device allows a car to drift or glide whenever the component of the force of gravity in a direction parallel to the road surface on a down-grade, or the force due to the momentum of the car, tends to make it travel at a higher speed than that corresponding to the engine speed. With such a device embodied in the transmission, as soon as either of these forces tends to make the car over-run the engine, the latter is automatically disengaged.

The resultant advantages are:

A saving of fuel and oil.

More silent operation.

Easier gear shifting ability to get into conventional second gear or high gear at any car speed to use engine as a brake on steep grades.

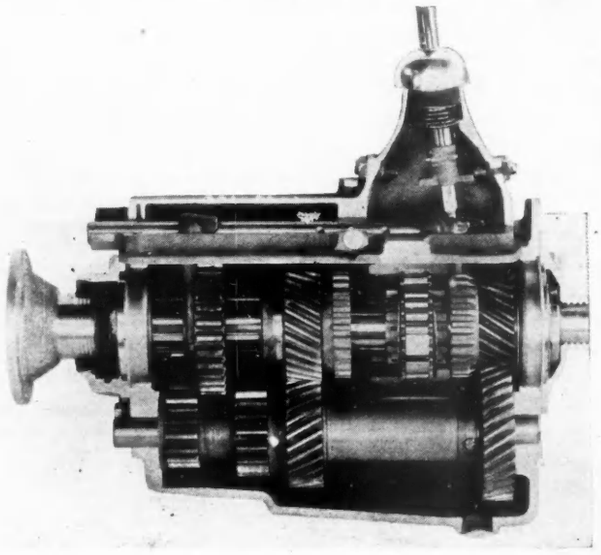
Reduction of wear and tear on the engine.

Reduction of wear and tear on the driving train including tires owing to the elimination of jerky operation.

Easier operation—the clutch seldom has to be used.

Free-wheeling devices have been used in Europe (and particularly in England) for a number of years. However, most of these have been separate from the transmission and of rather complicated design. In the Studebaker the free-wheeling mechanism is embodied directly in the transmission and adds but little to the bulk, the weight and the number of parts of the latter.

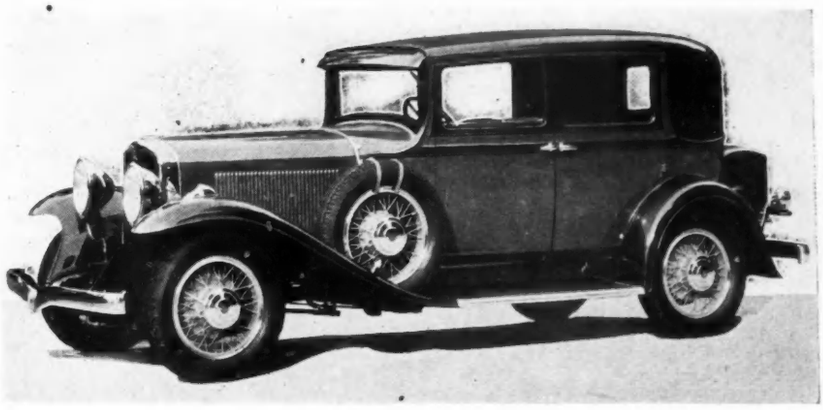
A simple free-wheeling device on an automobile would be open to the objection that it would prevent the use of the engine for braking purposes. Since it is necessary to descend long, steep mountain grades "on the gears," in order to save the regular brakes, means must be provided to render the free-wheeling device inoperative whenever this is desired. In the Studebaker cars this is accomplished by merely continuing the motion of the shift lever in the direction from high to second-speed position through the normal second-speed position until the members of the roller ratchet providing the free-wheeling action are locked



Assembly of three-speed transmission and free-wheeling device, with case, shown in section - - - - - - - -

Free-Wheel Eight Lines

By Athel F. Denham



New series Studebaker Commander Eight with five-passenger brougham body - -

together, the transmission then acts exactly like one of conventional design. This arrangement is provided for both high and intermediate gears.

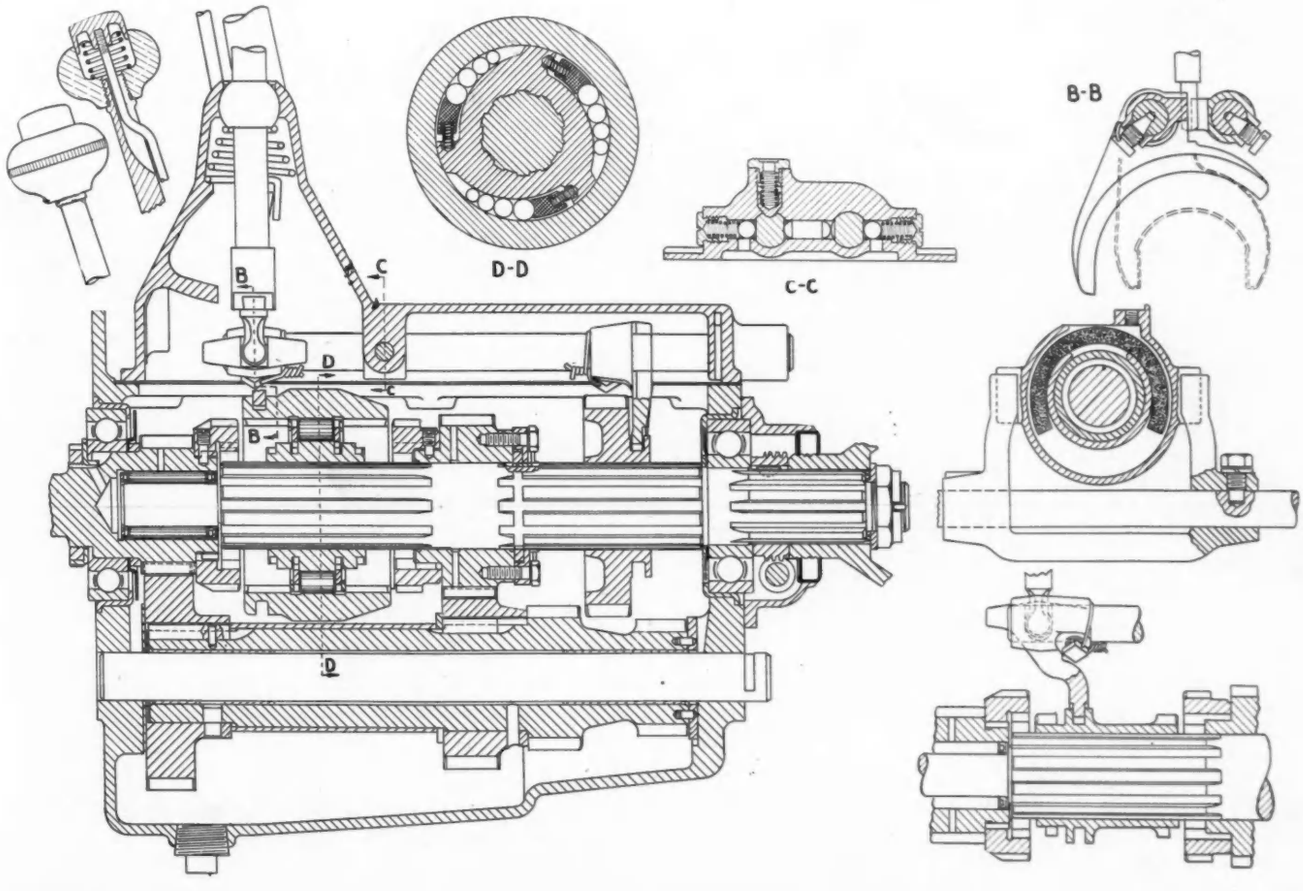
The free-wheeling feature applies to three eight-cylinder chassis models, the Commander and the two Presidents, the latter differing in lengths of wheelbase. In the table on page 43 the prices for all three lines are given, together with the prices of the corresponding models last year.

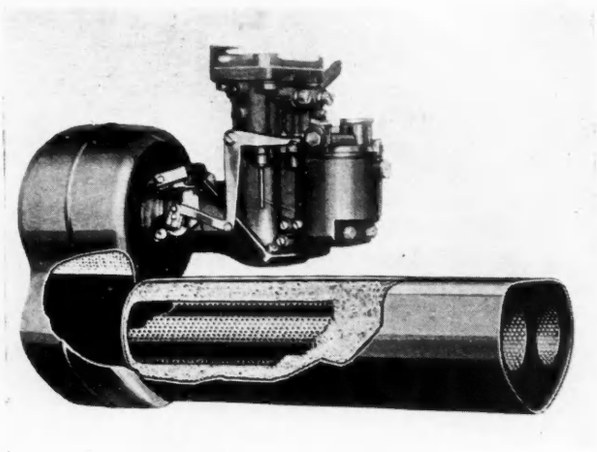
All three chassis have longer wheelbases. The gen-

Longitudinal section through transmission of new Studebaker eights, with detail views of the transmission and the clutch throw-out.

Cross-section of the roller clutch by which the free-wheeling is obtained, which clearly shows the three sets of four rollers each.

Shift-lever knob with latch-rod button, the shifter forks and the lock for the shifter bars - - - -





Carburetor silencer to subdue power-roar - - - - - - - -

eral appearance of the cars has been improved by the adoption of new radiator shells, giving the radiator with its false front in grill form a deep and narrow effect which is further accentuated by the absence of headlamp tie-rods. The headlamps, which have an oval outline when viewed from the front, are carried on the fenders on brackets secured to the frame side rails, these brackets also serving as fender braces. New-style parking lights, chromium-plated and streamlined into the front fenders, on top of which they are mounted, are another novel feature of the equipment.

Molding treatment on all bodies has been refined, as will be noted from the accompanying illustrations. Another important body improvement is found in the adoption of French roofs with metal roof side panels.

Studebaker Brief Specifications

Commander Eight

	New	Old
Wheelbase	124 in.	120 in.
Tire size	19/6.00	19/6.50
Horsepower	101	80
Temperature control	thermostat	.....
Gas tank capacity	17 gal.	.....
Transmission gears	helical	spur
Manifolds	duplex	single
Main bearings	steel back	bronze back
Brake diameter	13 in.	.....
width	1¾ in.	1¾ in.
Valve timing,		
intake opens	15 deg. B.T.C.	.....
exhaust closes	10 deg. ATDC.	.....
Bumpers standard?	Yes	No

President Eight

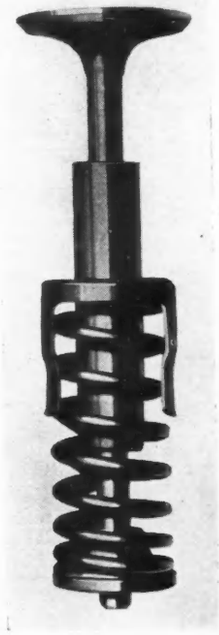
Wheelbase	130 and 136	125 and 135
Tire size	19/6.50	20/6.00
Horsepower	122	115
Temperature control	thermostat	Auto. Shutters
Gas tank capacity	20 gal.	.....
Transmission gears	helical	spur
Main bearings	steel back	bronze back
Bumpers standard?	Yes	No

All three models have sloping windshields to reduce glare in night driving. Further carrying out the new motif are the wide, single-bar Le Modern chrome-plated bumpers.

The new Studebaker free-wheel transmission is of conventional design except for the use of silent helical gears and a novel arrangement for securing engagement in the intermediate and high-gear positions, which permits, at the option of the driver, free-wheeling at any time in either of these gears whenever the accelerator pedal is released. The free-wheel unit or "pineapple," as it has been named, due to its shape, also allows easy shifting between the high and intermediate gear positions without the necessity of releasing the clutch and without the necessity of bringing the car and engine speeds to synchronism, as is required in shifting the ordinary transmission. The new free-wheel transmission can be shifted from high to second even at the highest attainable car speeds without thought or skill on the part of the driver and without danger of clashing gears or otherwise harming the car.

These novel and useful features are obtained through the use of the free-wheel unit, which is located as a shifting member between the high and intermediate gears. In the new Studebaker free-wheel transmission there are two pairs of quiet helical gears which are always in mesh. As may be seen from the attached cutaway section, one of these gears is located at the forward end of the transmission and drives the countershaft. The other pair give the second speed reduction to the main splined shaft. The second-speed mainshaft gear runs freely on the main shafts as opposed to the usual construction of having this gear splined to the shaft. It is held from axial movement on this shaft by a thrust washer locked to the shaft.

The "pineapple" consists of an inner cam member splined to the main driven shaft and free to be moved forward or back into high or intermediate gear positions. This cam member supports an outer shell or sleeve having internal teeth at either end arranged to engage corresponding toothed clutch members on the forward pinion gear or the rearward second-speed gear. Interposed between the inner cam member and this outer shell are 12 rollers arranged in three groups of four each which are held in contact with both members under a light spring tension. This com-



Valve-spring damper which checks valve-spring surging - - - - -

bination of inner and outer members and rollers is arranged so that driving torque will be transmitted from the outer member to the inner (and, therefore, to the main driven shaft) only in the drive direction. In other words, the "pineapple" unit consists of a multiple-roller "one-way" clutch which can transmit driving torque only from the engine to the rear axle.

It may thus be seen that when the pineapple is shifted forward so that the outer member only is in clutched engagement with the main driving gear that the driving torque will be transmitted through the roller clutch to the main driven shaft and thus to the rear axle giving high gear. Likewise, when the pineapple unit is shifted rearward until the outer member is in clutched engagement with the second-speed gear a one-way second-gear connection is obtained.

To provide for certain special conditions, when it is not desirable to operate the car in the free-wheel positions, such as when descending long mountain grades, and it is desirable to use the engine as a brake, the free-wheel unit can be rendered inoperative or locked into position or two-way engagement by means of special clutch jaws on the forward and rearward end of the pineapple inner cam member.

This positive engagement feature is normally not used, a button on the gear shift lever being provided which must be depressed before it is possible to move the lever into the positive drive position.

The shift lever arrangement is the conventional three-speed standard shift. Normal intermediate and high positions give free-wheel operation. The positive drive, when free wheeling is not desired, is obtained by depressing a button-type latch located in the top of the shift lever ball which allows moving the lever slightly farther into the intermediate or high positions. If it is desired to shift in the normal manner without using the free wheel it is only necessary to depress this button when shifting, in which case the transmission will handle the same as previous conventional designs. Low and reverse gears are of conventional spur gear design.

The "free-wheeling" arrangement makes for an exceptionally easy shift, for if the speeds of the two gears that must be meshed when engaging second speed are not equal, there is only the low inertia of the clutch sleeve to overcome in order to effect the engagement. As a result, even if the two engaging parts are considerably out of synchronism the shift can still be made, and only a mere click will result. The free wheel arrangement also makes it possible to shift down into second speed without double clutching, a procedure which would normally be accompanied by much clashing of gears. To make shifting still easier, alternate teeth of both members of the dog clutch are undercut, as in some transmissions used at present. There are two sizes of these transmissions, one for the two Presidents, and one for the Commander.

Next in importance to the new transmission in the Studebaker eights is a device developed as the result of extended research work in acoustics. With the high road speeds of today the question of "power roar" has assumed considerable importance. While the phenomenon is well known to all familiar with automobiles, in the past it has been generally accepted as a necessary accompaniment of high power operation, and little was known regarding its exact cause. Investigations of this subject by the Studebaker engi-

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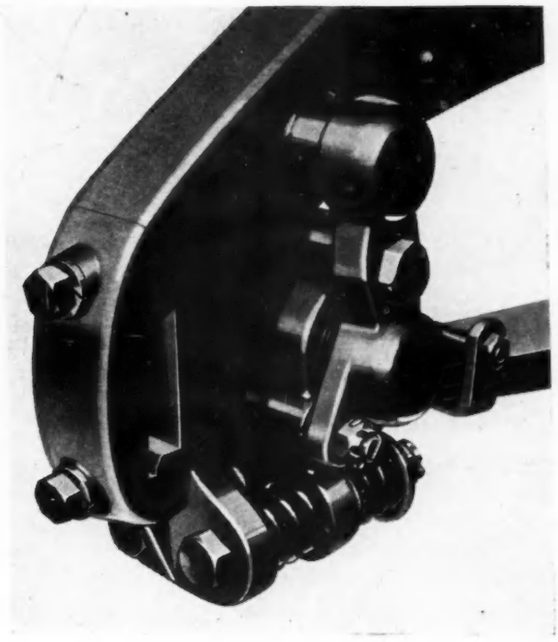


Anti-kick shackle to prevent wheel fight

Studebaker Prices

Model	New Price	Old Price	Increase
Commander Eight			
Touring, 5-p.	....	$1,495	..
2-4-p. Roadster	....	1,595	..
2-4-p. Convert. Cabriolet	....	1,695	..
4-p. Coupe	$1,585	1,495	$90
Victoria	1,585	1,515	70
5-p. Brougham, Sport Equip.	1,785	1,695	90
5-p. Sedan	1,585	1,515	70
5-p. Regal Sedan	1,785	1,695	90
President Eight—130-In. Wheelbase			
4-p. Roadster, Sport Equip.	$1,950	$1,795	$155
Convert. Cabriolet	....	1,995	..
5-p. State Sedan	....	1,995	..
5-p. Sedan	1,850	1,795	55
7-p. State Sedan	2,050	None	New
2-p. Coupe	1,850	None	New
4-p. Coupe	2,050	None	New
President Eight—136-In. Wheelbase			
7-p. Tourer	$1,850	$1,845	$5
7-p. State Tourer	2,150	2,145	5
7-p. Sedan	2,150	2,095	55
4-p. Victoria.	2,350	2,295	55
5-p. Sport Brougham	2,350	2,345	5
7-p. State Sedan	2,350	2,295	55
7-p. Limousine	2,600	2,595	5

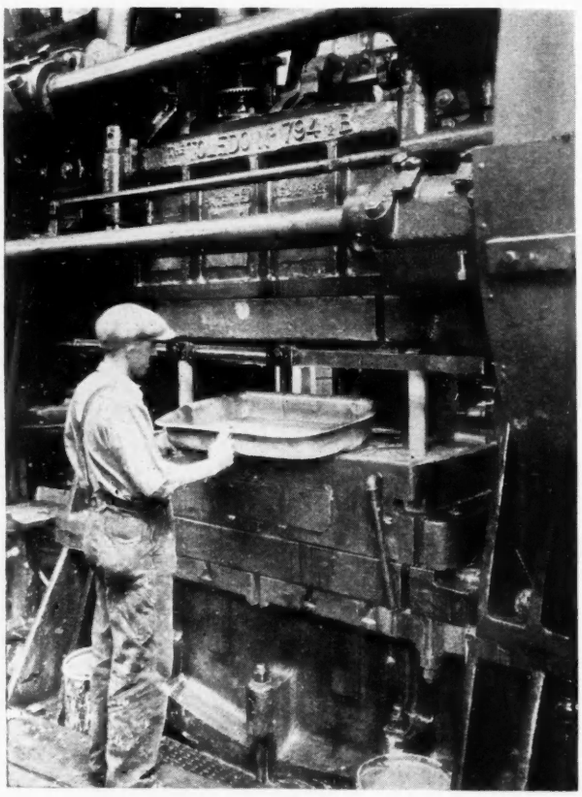
Note: All Broughams, State and Regal models and Limousine carry six wire wheels and trunk rack. Commander Broughams and President 5-p. Brougham equipped with trunk and suitcases.

Ford Rustless Steel Radiator Shells Need 17

Polishing difficulties are many because of character and toughness of material - - - - - - -

Smaller bright parts are made of scrap from stampings - - - - -

BASED conservatively upon an estimated production of 2,000,000 Ford cars, about 8500 tons of rustless steel sheet from all available sources of supply will be required next year for bright parts, such as the radiator shell, lamps and hub caps. Thus, once again a potentially wide market has been opened to a new product through the development of the requisite production process, in this case involving methods and technique for deep drawing rustless steel sheet as well as the development of automatic polishing and buffing machines which solved a problem of almost insurmountable difficulty.



First deep-drawing operation on Ford radiator shell, showing rustless steel pan - -

Rustless steel for Ford production comes in pickled-finish sheets 24-gage 78¾ in. long and 30¼ in. wide. The large sheet is cut into two ovals, each blank being sufficient for a radiator shell, one headlamp case, one tail light body, one tail light door, two hub caps and two cowl lamp bodies.

In all, 17 operations are required in the press shop to produce the radiator shell ready for the polishing operation; of these three are deep drawing operations, the other 14 being individual steps of edging and punching, such details as the filler cap opening, name plate opening, the cut-out at the bottom of the pan and the edge for the hood ledge.

Polishing of the finished stamping is secondary only in difficulty to the primary press shop operations, for rustless steel sheet is so soft and tough that ordinary methods of polishing and buffing are entirely inadequate. Accordingly, Ford engineers developed a large battery of high-production polishing and buffing machines which handle the job automatically, although even here several hand repair operations are found necessary in the present stage of development.

Before proceeding with the actual press shop and polishing department operations, it may be well to say something about the characteristics and behavior of rustless steel sheets as disclosed by their experience with it. Compared with the ordinary carbon steel sheet, rustless steel sheet is approximately 35 per cent more ductile, but the ductility decreases faster during drawing operations due to its cold hardening properties. Speaking relatively, rustless steel sheet is softer and stiffer, due to its higher yield point, and demands a greater allowance in the die construction for the factor of spring-back. It requires considerably more pressure to form, thus inducing severe abrasive action which produces inordinate wear on dies.

Accordingly, die design must be modified and special die steel is used, as will be explained later. Moreover, a special drawing solution for lubricating the sheet and dies is required. Although the composition of the drawing solution, so far as exact proportions go, is not available, it consists of the following ingredients: Lithaphone; cup grease No. 2; sulphur; talcum powder; paraffin oil, all prepared in definite proportions and thoroughly mixed.

At critical sections in the die where considerable drawing occurs there is a definite tendency to stretch, but this is successfully offset by providing greater clearance at these points. Strangely enough, although rustless steel sheets exhibit unusual cold hardening properties, it has been found possible to eliminate en-

Press Operations

By Joseph Geschelin

tirely the annealing operation preceding the operation on the expanding die. At first it was necessary to anneal before forming the filler neck opening, but this too was eliminated by punching a larger hole.

Use Same Presses

In the press shop they use the same presses as before. At the head of the line the large sheet is sheared into two sections, each of which is punched out into an oval shape. These go through greasing rolls which apply the drawing compound and then pass directly to the first deep drawing operation. Here the oval is drawn into a form 4½ in. deep on a toggle press of about 250-ton capacity, using the same drawing speed as that required for ordinary carbon steel sheets. An air attachment adjusted to 35 lb. per sq. in. pressure on the knock-out pad locks the blank to the drawing punch to prevent the metal from skidding while being drawn into the die.

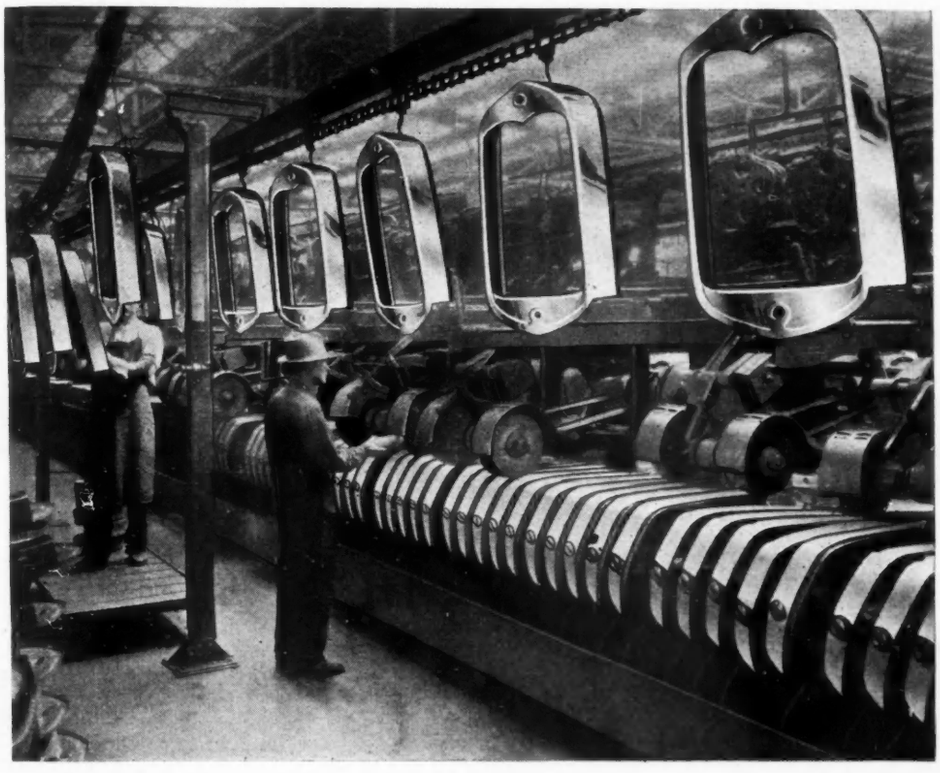
Because of the unusual pressure applied on the draw rings to keep the metal from wrinkling it was found necessary to provide double draw beads along the long side so that this pressure could be reduced and form good shells without danger of breakage. Considerable judgment and experimental work is necessary to determine the length and position of the draw beads, as these elements are found to be rather critical.

In the second operation the excess edge on the shell, due to these additional draw beads, is trimmed off. The third press operation is a redraw which straightens the sides and provides a general contour-finish all around. The expanding die is the fourth and rectifying operation. Succeeding operations, such as punching holes, pressing the edge for the hood lace, etc., are performed individually in separate setups, making a total of 17 operations in the press shop.

Before the shells leave the press shop they are inspected and undergo hand repair operations to remove rough spots and irregularities which might cause difficulty in the polishing department. Then they are attached to the overhead monorail conveyor and are carried directly to the polishing room in the adjacent building.

Here the shells are assembled on a fixture which accommodates five shells at a time. This fixture is ingeniously designed to permit the turning of the shell in all the positions required in the process, as will be noted from the view taken in this department. The automatic polishing equipment designed for this department is shown in Fig. 1. It consists essentially of a series of separate machines each with two wheel heads individually driven. Wheel heads reciprocate automatically, the amplitude of travel being controlled by box cams which also positively guide the wheel head along the contour of the working surface. By this expedient the wheels follow the working contour under a positive and unvarying pressure. As will be noted in the illustrations, the racks holding the shells are set on the floor conveyor which moves at a slow rate along the line.

The wheels used in the polishing operations are as follows: 180-grain abrasive, 200-grain emery and 244-grain emery flour. Grease is used plentifully throughout and the wheels are constantly dressed with



All polishing operations are automatic. Note operator greasing wheels - - - -

a tallow and oil stick, applied by the machine operator.

The initial operation is to polish the face of the shell, next the right and left sides and finally the top. Between operations the shells are indexed by the operator to the position required for the succeeding step. Upon emerging from the last operation the shells pass to the regular floor-type polishing and buffing lathes where they undergo a hand-repair operation to polish out low spots and points at the corners, edges, and around the filler hole, which are inaccessible on the automatic machines under present conditions.

Shells Pass to Buffers

Finally, the shells pass to a parallel battery of buffing machines which accomplish the final polishing, going through the same steps as described above. The dressing used throughout these operations is a special stainless steel compound which we understand is available commercially.

Now that the process in the polishing department is operating smoothly, a study is under way to refine it so as to eliminate partly, if not entirely, the hand operations which now are necessary. This step is desirable from the standpoint of cost rather than quality, since the product turned out at the present moment is comparable to a good plated finish.

Although the generally accepted principles of die design apply equally well to dies for rustless steel, nevertheless there are a number of important differences which have been disclosed by experience. For example, it was noted earlier that the large blank requires double draw beads to allow the metal to flow freely without using excessive pressure, which would cause breakage. Again, the abrasive action of rustless steel is so severe that additional clearance space between the walls of the die and the punch is required. Ford engineers have decided tentatively upon a clearance of 0.007 in. above the thickness of the metal itself. Another variation of prime importance is that all working surfaces of draw dies must be finished with a stone instead of an emery polishing wheel to produce surfaces free of imperfections because any slight inaccuracy or indentation of the surface will accelerate scratches and scoring of the die.

The draw die and rings used in the production of the Ford radiator shell are made of cast iron of close grain having the following specifications: Carbon, 3.25; manganese, 0.45; chrome, 0.70; nickel, 2.00; silicon, 1.25. After machining, the finished part is heated to 1550 deg. Fahr. and oil quenched; it is reheated to 900 deg. Fahr. and cooled in air. The Brinell hardness is between 286 and 321.

The draw punch is made from a special chrome, non-shrink, air-hardening die steel especially adapted for the deep drawing of rustless steel. It is built up of sections seated in a cast-iron punch shoe. The punch sections are heat-treated in the following manner: First, they are preheated to 1350 deg. Fahr., then transferred to a furnace which is held at 1900 deg. Fahr., and allowed to soak to 1900 deg. Fahr. They are then removed from the furnace, suspended from a wire and cooled in air. Finally, these sections

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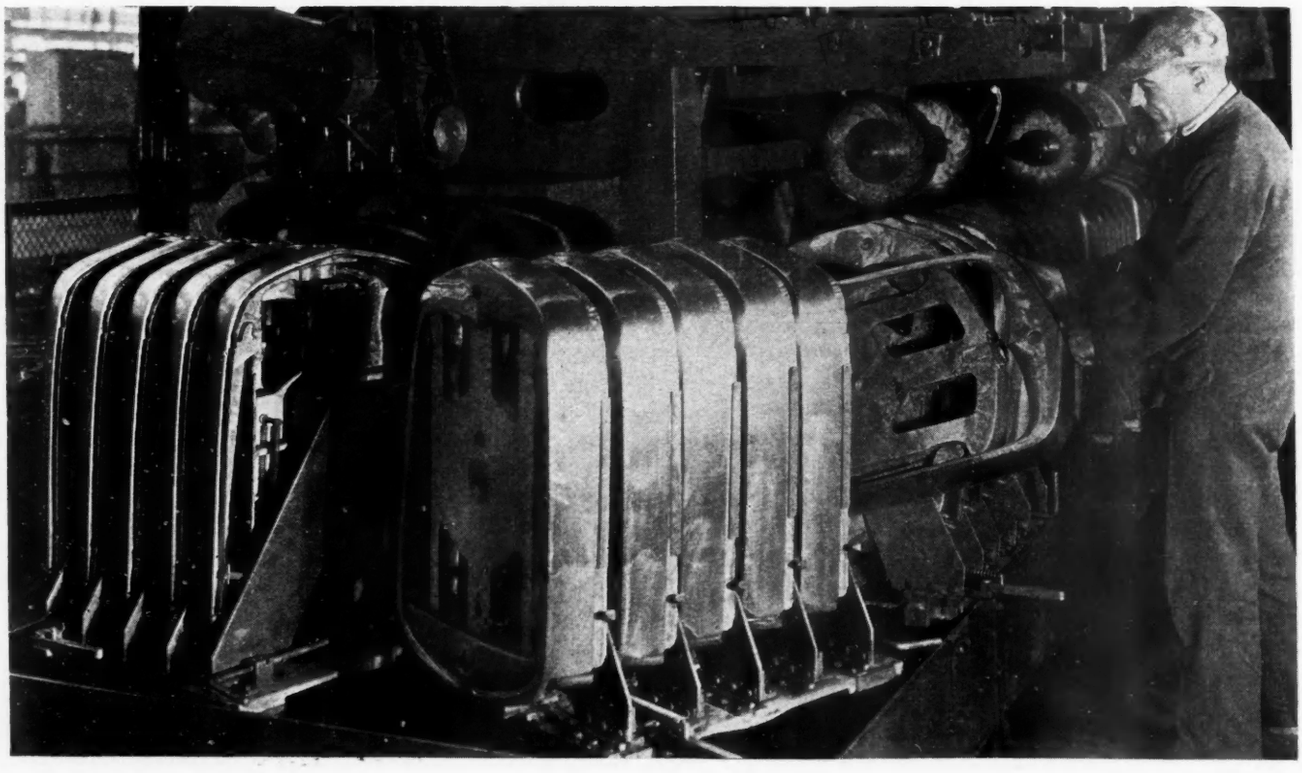
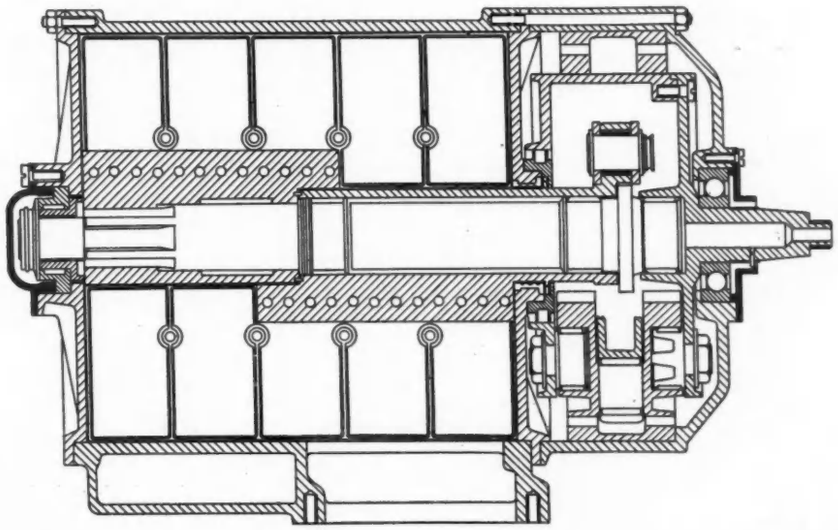
Buffing radiator shells. Operator demonstrating universal fixture which permits shell to be turned in all positions - - - -



Scavenging and Supercharging Blower Developed for Diesel Aircraft Engine

Air pump of "flapping" type, invented by Pierre Zens, of Paris, can be made in a wide range of capacities Unit may be connected directly to the engine - - -



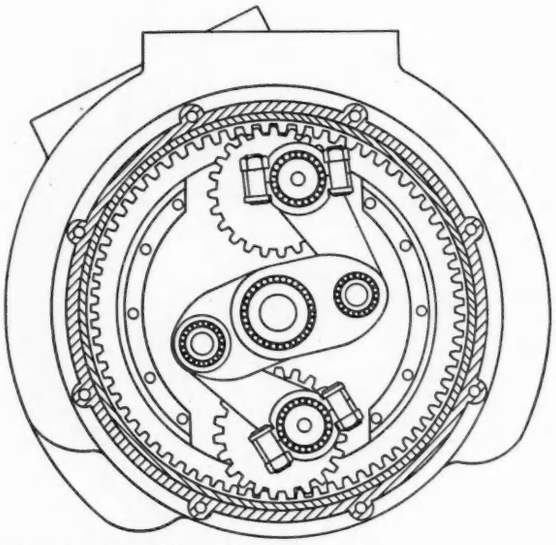
Pierre Zens blower has a cylindrical housing made of Elektron for lightness - - -

AN air pump of an entirely new type which can be used for supercharging purposes has been invented by Pierre Zens, 4 rue Cambaceres, Paris. Several sectional views of the pump or blower are shown herewith. The particular design illustrated has a capacity of 20 liters (0.7 cu. ft.) per revolution of the driving shaft and is intended to operate at 2000 r.p.m. It was developed to serve as a scavenging and supercharging blower for a Diesel-type aircraft engine working on the two-stroke principle. The blower, of course, can be made in a wide range of capacities.

By referring to the drawings it will be seen that the blower comprises a cylindrical housing which for the sake of lightness is made of Elektron (a magnesium alloy). A driving shaft enters the housing centrally at the left and carries a two-armed spider on which there are laterally projecting studs serving as supports for planetary pinions. The two planetary pinions mesh with an internally toothed stationary gear ring mounted inside the shell of the housing.

Both the gear ring and the planetary pinions are double, and between the halves of each planetary pinion there is an integral crankpin. Naturally, as the driveshaft revolves, the planetary pinions roll on the inside of the internally-toothed ring, and the crankpins then revolve around the axes of the pinions. From one of the crankpins a link connection is made to an arm on a shaft concentric with the driving shaft and piloted in the latter, while from the other crankpin a similar connection is made to an arm on a sleeve on the shaft. By this crank and link connection both the shaft and the sleeve on it are given an oscillatory motion which is superimposed upon their rotary motions, the latter being equal to that of the driving shaft. The two cranks are set in opposition to each other, so that as the motion of the driven shaft is accelerated that of the sleeve is retarded.

Both the driven shaft and the sleeve thereon have three vanes each secured to them, the vanes on the shaft being interposed between the vanes on the sleeve. As the motion of each set of vanes is accelerated and retarded alternately, adjacent vanes alternately approach and recede from each other. This flapping of the vanes produces the pumping action. The particular advantage of the design is based on the fact that there are six working chambers. Each chamber expands and contracts three times per revolution of the driving



Cross-section through planetary gearing of P.Z. blower - - -

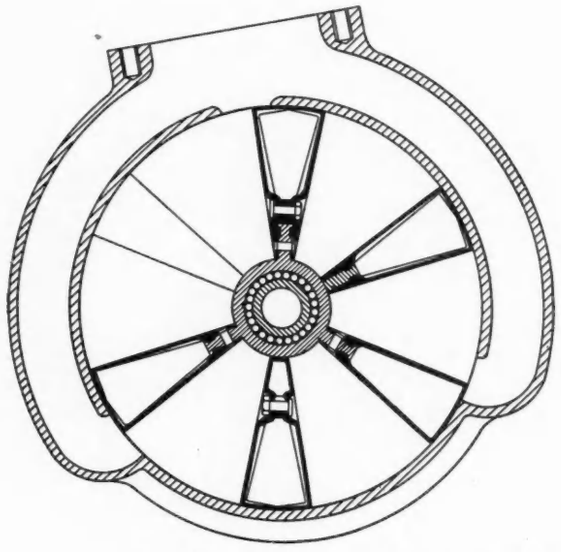
shaft, and since the difference in the angular spacing of adjacent vanes at the beginning and end of each stroke is 80 deg., the total displacement is equal to $6 \times 3 \times 80 = 1440$ deg. Hence the displacement of the vanes is equal to $1440/360 = 4$ times the volume of the cylindrical housing.

The actual delivery, of course, depends upon the degree of gas tightness between the vanes and the housing. Since the vanes turn in the housing without lubricant and without friction, it is, of course, necessary to provide clearance to allow for differential expansion. It has been found that the leakage losses are slight, owing to the large surface areas over which any leakage currents must pass, the skin friction retarding the flow; and it has been found leakage decreases as the speed increases. Ex made with a model indicate that a volumetric of 90 per cent may be expected for air press exceeding 15 lb. p. sq. in.

Since there is no mechanical contact bet rotor and the housing, the mechanical losses a to those at the bearings and the crankpins case of a high-speed compressor, such as t.. trated, the bearing losses can be reduced by of so-called needle bearings. The losses due to flow through the blower are said to be quite lov to the fact that fluctuations in gas speed are hel .vn to a minimum and the admission and delivery r :ts are made quite large.

In order to relieve the loads on the crankpins to the inertia of the vanes, the delivery ports so located that they close a moment before the delivery stroke is completed. This results in the almost instantaneous generation of an air pressure of about 15 lb. p. sq. in. in the blower chambers, which cushions the vanes and greatly reduces the maximum bearing load on the crankpins.

The blower illustrated, with a housing of Elektron, weighs 44 lb.



Cross-section through working chamber of blower - - - -

Ford Rustless Radiator Shells

(Continued from page 46)

are heated to 980 deg. Fahr., being held in the furnace one hour for each inch of section thickness.

Although a bare statement of the processes described above, and the determination of empirical experience values reflects only faintly the magnitude of the accomplishment of the Ford organization, those who have worked with the rustless steel will appreciate the effort and technical skill that underlies it. For instance, it is astonishing to find that there are no annealing operations in the press shop, although this is partly due to the relatively small size of the shell and good physical properties of the metal. Nevertheless, it indicates that more than usual attention has been given to the design of the dies and the routing from press to press.

Another striking thing, although quite consistent with Ford practice is the utilization of waste, for the by-products from a single sheet will produce most of the bright parts used on the car.

Polishing methods here deserve special emphasis because they represent the practical solution to a technical problem involving almost insurmountable difficulty. By the design of the special equipment described earlier and by virtue of proper utilization and routing, the final product is made comparable in finish to their best plated product. Further refinements in the process are expected to reduce cost in this department by eliminating or at least minimizing, hand operations.

Sleeve Valve Engine Developed With Super-Expansion Feature

Design includes—

Two pistons, working at different speeds, in each cylinder.

Unusually high compression made possible by retention of abnormal amount of dead gas, acting as an anti-detonant - - - - -

AN engine combining the feature of operation without the usual poppet valves with expansion to a volume greater than that swept during the intake stroke has been developed in New York. There are two pistons in each working cylinder, the compression space being formed between the heads of these pistons. While this feature of two pistons working in a single cylinder is not new, the design here shown differs from others of the same type in that the upper piston makes only one stroke to two of the lower one. The valving functions are performed partly by the upper piston and partly by a sleeve surrounding it.

In addition to the main crankshaft in the crankcase, there is a crankshaft on top of the engine, from which both the upper, short-stroke piston and the sleeve are operated. The two crankshafts are connected together through a vertical shaft at the forward end, with spiral bevel gearing at both top and bottom, so laid cut that the upper crankshaft makes one revolution to two of the lower one. The upper crank has two throws per cylinder, one crankpin being connected to the upper, short-stroke piston, the other to the valve sleeve.

In order to understand the functioning of this engine it is necessary to study the valve timing, which is illustrated in Fig. 2. The inlet port is opened when the main crank is 5 deg. past the top dead center position. The crank of the upper piston is then 22.5 deg. past top dead center. The inlet period continues until the main crank is 50 deg. past bottom dead center. Throughout the inlet period the upper piston has moved downward, and the effective displacement during the inlet stroke therefore is less than the displacement of the main piston. It will be noted from the second view in Fig. 2 that the inlet period comes to an end when the upper piston in its downward motion closes the ports in the sleeve, which latter at

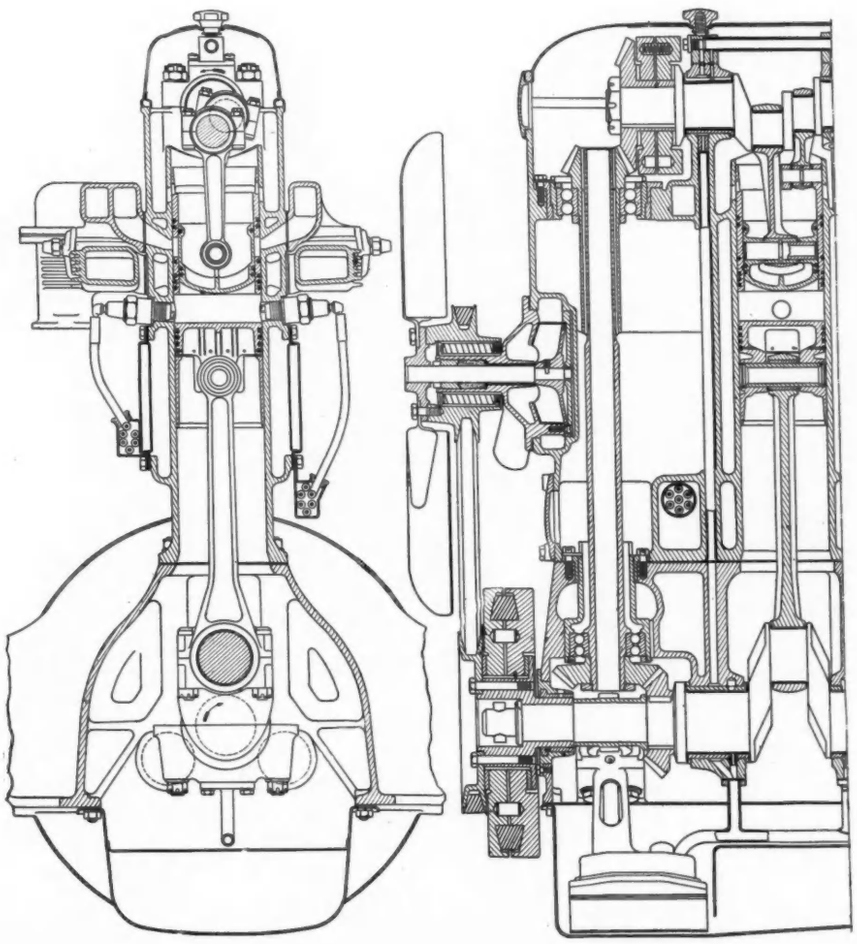


Fig. 1—Cross and longitudinal sections of the super-expansion engine

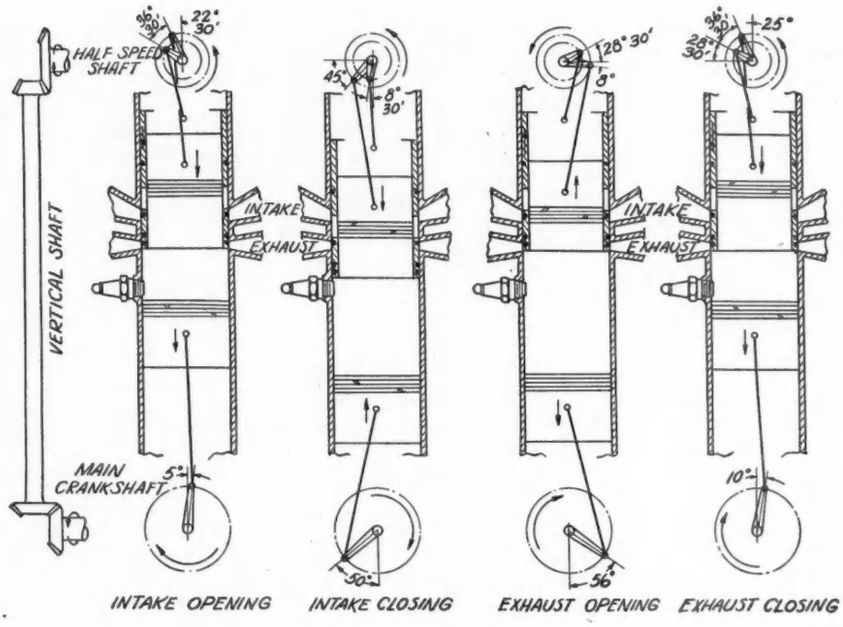


Fig. 2—Diagram showing the operation of sleeve-valve and auxiliary piston

the moment is also moving downwardly, but much more slowly than the upper piston.

In the third view in Fig. 2 the moving parts are shown in the position corresponding to opening of the exhaust. The lower edge of the sleeve, moving upwardly, uncovers the exhaust port in the cylinder wall. Finally, the exhaust port is closed when the sleeve reaches the same position on the following downward stroke. Any desired timing can be obtained to suit different requirements.

Operation of the upper and lower pistons at a different number of strokes per minute has the effect—unusual in internal combustion engines—that the clearance volume is not the same at the end of the exhaust stroke as at the end of the compression stroke. The volumetric relations in this engine at different points of the cycle are graphically illustrated in Fig. 3. The clearance space is smallest at the end of the compression stroke, as indicated in the third view, the compression volume being denoted by *A*. When the main piston is at the bottom of its stroke, as in the second view, which corresponds to the end of the inlet stroke, the combustion chamber volume has increased by a volume *S* corresponding to the sweep of the main piston, and by a volume *B* corresponding to motion of the upper crank from 20 deg. ahead to 70 deg. before bottom dead center. While the lower crankshaft passes through a half revolution or 180 deg., the upper crankshaft passes through 90 deg., and since the latter is 70 deg. from its bottom dead center position when the main crank is in bottom dead center, it will be 160 deg. from bottom dead center when the main crank is in top dead center. This motion of the upper crank from 70 to 160 deg. from bottom dead center results in an additional displacement *D* by the upper piston. Consequently, at the beginning of the inlet stroke the clearance volume (or so-called dead space) is much greater than the compression volume, being equal to $A + B + D$. The direct result of this is that the cylinder is not cleared of products of combustion to the same extent as is the case in a conventional engine. The theoretical volume of dead gases remaining in the cylinder, instead of being *A*, is equal to $A + B + D$.

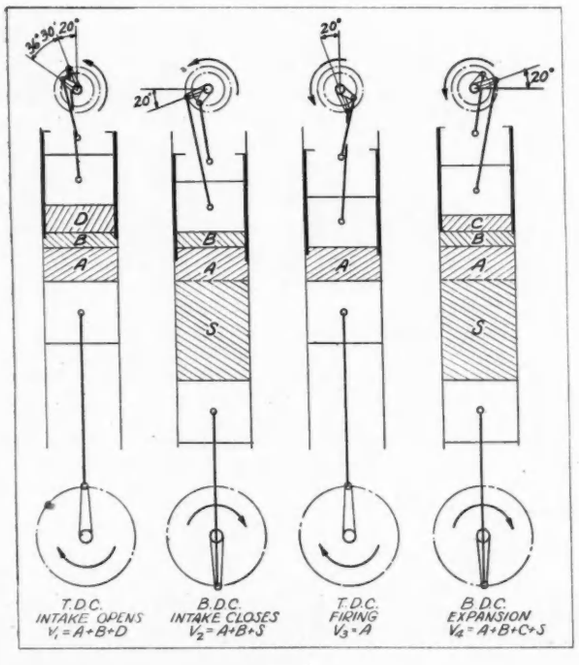


Fig. 3—Volumetric relation at the ends of the four strokes of the cycle

At the end of the expansion stroke the main piston is all the way down in the cylinder, while the crank to which the upper piston is connected is 110 deg. from its lower dead center. Since a motion of 70 deg. from bottom dead center produces a displacement *B* by the upper piston, there is an additional increase *C* of the combustion chamber corresponding to motion of the upper crank from 70 deg. to 110 deg. from bottom dead center. Hence the effective expansion stroke is $S + B + C$, and the expansion ratio $(S + A + B + C)/A$.

While the retention of a larger amount of spent gases in the cylinder might be considered a disadvantage, in that the working charge is more diluted and therefore will not produce as high an explosion pressure as a less contaminated charge, there is an accompanying advantage in that the spent gases act as an anti-detonant and permit of the use of a higher volumetric compression ratio. A further gain is to be

expected from the super-expansion. In the case of a single cylinder experimental model built with a compression ratio of 6 to 1, the expansion ratio was 6.59 to 1.

Tests on one cylinder of a six-cylinder engine of this type were made at the University of Michigan by Prof. W. E. Lay. The other cylinders of the engine were stopped off during the test, so that combustible charge could reach only the one cylinder. In the report of this test all results are given in indicated values, for the reason that when only one cylinder is generating power while the friction and pumping resistances in six cylinders must be overcome, the net power is necessarily small. The indicated mean effective pressure reached a value of 150 lb. p. sq. in. and the specific fuel consumption fell as low as 0.4 lb. per indicated hp.-hr., according to the report of tests made by Prof. Lay.

Studebaker Incorporates Free-Wheel Transmissions in Both Eight Lines

(Continued from page 43)

neering staff convinced it that the phenomenon is produced by surging of the column of air in the intake manifold, producing an organ pipe effect. Wire-mesh and steel-wool air cleaners first indicated this cause, their adoption decreasing the noise to some extent. As a further step Studebaker has now worked out a muffler for the carburetor air intake which practically eliminates "power roar" and carburetor hiss.

The muffler itself consists of two 1 15/16-in. perforated tubes, which are surrounded with cotton fibers. The unit is similar in action to the steel-wool exhaust muffler with which Studebaker cars are equipped. The unit, which is horizontally mounted below the carburetor and bolts onto a housing inclosing the Air Maze air cleaner, forms a surge chamber. The cleaner attaches directly to the carburetor air intake. Duplex manifolds and carburetors are now used also on the Commander the same as on the President eights. The Commander now also has a higher-lift camshaft, resulting in increased power. Changes in the cam contour insure better volumetric efficiency and better torque at higher speeds, due largely to an overlap of the inlet and exhaust periods amounting to 25 deg.

A new torsional vibration damper is a feature of Studebaker President and Commander eights. This damper incorporates a number of steel balls between two plates. As the speed of the engine increases, the centrifugal force on these balls tends to force the two plates apart, increasing the pressure on the friction element, and thus enabling the device to damp out harmonic vibrations at all engine speeds.

Valve Spring Dampers

Valve spring dampers are another innovation found in the new cars. They are in the form of caps fitting over the valve springs, the open ends of which bear against the center coils and check any tendency of these center coils to "surge." Steel-backed main bearing are now used on all models. A new oil-control piston ring by Perfect Circle is fitted. It has a double groove, the design resulting in a higher unit pressure and a more uniform bearing, thereby effecting better oil control and a material decrease in blow-by and resulting power loss. A thermostat is now built into the outlet riser of the cooling system.

Bell housings have been provided with external ribbing, this having the double effect of reducing distortion during manufacture and assembly, and of adding to the rigidity and strength of the case after completion.

Metal spring covers are now found on the President models, along with Houdaille shock absorbers and Fafnir ball-bearing shackles. The Commander has Lovejoy single-acting shock absorbers. An anti-kick shackle (as it is called by Studebaker) serves to prevent wheel-fight. It consists of a supplementary spring-loaded shackle on the fixed end of the left front spring (right for export). The Studebaker eights also carry the new Ross steering gear with its roller-mounted stud and low inherent friction.

Changes Made for Longer Service

Larger brakes have been adopted on the Commander eight, which are rod-and-lever operated, as are the brakes on the President. Larger tires (6.50/19) are found on the President eights. Pinions and ring gears on the Commander are of finer pitch than formerly, for increased quietness. Fans also have been improved for more quiet operation. The President models now have two-shoe duo Servo brakes which provide better braking and longer life.

Quite a number of body details have been improved. For instance, a new type of door bumper with a rubber-backed bronze spring is used and is said to stand up well. Steering wheels are of the three-spoke steel core type. Instructions are individually mounted, and include a clock on the President. Rear windows in coupes can be opened for ventilation, being crank-operated. Commander eights have a Bendix starter engagement, with the switch button mounted on the dash. President models have the mechanical-shift-type of engagement, pedal-operated. All cars have treadle-type accelerator pedals and dash heat controls. Steering gear locks are standard on all models, as are larger gas tanks, radio wiring, adjustable steering columns and adjustable seats.

Doubling of Italian Tariff Not Reprisal

Secretary of Commerce Lamont believes duty is in line with policy of relieving unemployment - -

THE view of Secretary of Commerce R. P. Lamont that the new Italian tariff duties on automotive products, effective June 30, were not applied in the nature of reprisal now has been generally accepted in Washington.

"The increase in Italian tariffs on the products is part of the established protective tariff policy of Italy to conserve their own large automobile manufacturing industry and to relieve the present unemployment," said Secretary Lamont. "This policy has been in operation for some years and under its pressure American exports of automobiles and trucks to Italy had decreased in value from $4,300,000 in 1924 to $1,270,000 in 1929, the latter figure constituting less than one-half of 1 per cent of our exports of these commodities.

"The Italian protective policy has likewise affected their imports of automobiles and trucks from France, Germany, Belgium, Austria and other countries, and the new rates apply equally to all countries."

Senator Vandenburg of Michigan, however, has expressed the view that increased duties in Italy "might easily be part of a campaign to force American manufacturers now engaged in expatriating capital to extend their operations there and benefit foreign labor."

Comparison of Italian Duties on Automotive Products

New Duties

	Gold Lire Per 100 Kilos
Passenger Cars:	
Weight in kilos:	
Up to 700	300
700 up to 1,200	400
Over 1,200	440
Other Motor Vehicles:	
Weight in kilos:	
Up to 700	300
700 to 1,200	400
1,200 to 1,800	320
Over 1,800	260
Bodies and Parts:	
For passenger cars	440
For other cars (trucks)	280
Motors, weight in kilos:	
Up to 100	340
100 up to 200	420
Over 200	460
Parts of Motors:	
Rough	260
Finished	480
Parts of Transmission and Steering Apparatus:	
Rough	260
Finished	480
Other Parts:	
Rough	200
Finished	440

Old Duties

	Gold Lire Per 100 Kilos	Plus Ad Val.
All Motor Vehicles (Passenger Cars and Trucks):		
Weight in kilos:		
Up to 400	120	35%
400 to 900	115	35%
900 to 1,600	65	35%
1,600 to 2,500	75	35%
2,500 to 4,000	95	..
Over 4,000	60	..
Bodies:		
For passenger cars	60	35%
For other cars (trucks)	45	..
Motors, weight in kilos:		
Up to 150	180	30%
150 to 300	162	30%
Over 300	126	30%
Parts of Motors:		
Rough	130	30%
Finished	130	30%
Parts of Transmission and Steering Apparatus:		
Rough	85 or 110	30%
Finished	85 or 110	30%
Other Parts:		
Rough	85	30%
Finished	85	30%

The Forum

First Automobile Track Races

Editor, AUTOMOTIVE INDUSTRIES:

I have been renewing my youth reading Ludlow Clayden's description of the old cars at French Lick and Mr. Heldt's review of Andrew L. Riker's achievements in the June 7 issue of *Automotive Industries.*

I have no desire to question the accuracy of so eminent an authority as P.M.H., but on page 889 he refers to what was probably the first automobile track race in the United States held during the Rhode Island State Fair in the fall of 1896, three years before the date mentioned in Mr. Heldt's account. I am sure of this, for it was the year that Allan Whiting and I graduated from the Sheffield Scientific School at New Haven and Allan wrote me at my home in Providence and asked me to look up an electrical contractor who could install the necessary apparatus for charging the Riker batteries at the Fair Grounds.

I acted as a helper and general handy man during this race. It was run in 5-mile heats; one each day of the fair. There were five entries. The Riker Stanhope with dos-a-dos seats for four people, a second electric entered by Morris & Salom, electric cab builders in Philadelphia, and three gasoline runabouts entered by Duryea.

Pulley Transmissions

These latter machines had horizontal water-cooled engines and power was transmitted to the rear axle by means of a pair of stepped cone pulleys with a short belt and belt shifter borrowed from the machine shop. The final drive from the second pulley to the rear axle was by means of cast-iron spur gears. Although Mr. Duryea and his crew worked feverishly between heats each night, and changed this ratio of final gearing many times, none of these gasoline vehicles were able to keep pace with the two electrics.

The Riker machine was driven by Allan Whiting, Mr. Riker's brother-in-law; Mr. Riker riding as a mechanic. They succeeded in winning the first two heats, but on the third day experienced some difficulty with the brass set screws which held the spur pinions, used for driving the rear wheels, on the ends of the armature shafts of the two electric motors. In this heat the Morris & Salom cab came in first, but Mr. Riker had his suspicions and demanded that the vehicle be examined by the judges before it left the track, and, sure enough, they found about 12 extra cells of battery tucked away under the seat contrary to conditions agreed to before the race. Mr. Riker, therefore, entered a protest which was allowed, and he was credited with winning this heat also.

Please understand that this so-called automobile race was sandwiched into the horse racing program on a one-mile dirt track; the best time of the winning vehicle was one mile in 2 minutes and 14 seconds, and there were plenty of horses on the track that could do better than this.

Riker Wins First Prize

The interest of the crowd in the grandstand began to wane about the fourth day, and while the fourth and fifth heats were run and Mr. Riker won all of them and secured the first prize of $1,500, he also received many boos and cat-calls from the grandstand on the last two days. All the vehicles continued in the race, however, and the two electrics invariably came in first and second, with the three gasoline vehicles trailing.

I should be interested to know if you have any record of automobile races at any time held in the United States prior to September, 1896.

D. C. FENNER.

It is correct that the Narragansett races took place in 1896 and not in 1899, and the Riker machine raced there was built by the Riker Electric Motor Co. of Brooklyn and not by the Riker Electric Vehicle Co. of Elizabethport, which was organized later. The Narragansett races were probably the first automobile track races held in this country.—*Editor.*

Early Front-Drive Car

Editor, AUTOMOTIVE INDUSTRIES:

Seeing the article signed A. E. Osborn on page 848, I wish to point out that I had a front-drive car in 1902. This car was imported by J. Ovington Payne and was on exhibition in 1901; it also was entered for the endurance run between New York and Philadelphia. This car was a front-wheel drive and built in Berlin by Kuehlstein & Vollmer. I used that car to carry passengers from Manhattan Beach to Coney Island. The body was of a bus type and we called it a depot wagon.

WILLIAM BARBER.

JUST AMONG OURSELVES

Battle for Dealers May Bring New Strategy

THE battle for dealers bids fair to be impregnated with new aggressiveness as summer and fall wear on. New models, new service policies, new sales aids, all will be made the basis for concerted drives for converts from the ranks of rival dealer organizations by various passenger car manufacturers.

Which brings to mind the comment we heard made by a veteran automobile merchandiser one time. "If we spent as much time and money," he said, "trying to keep the good will and the contract of the dealers we have as we do in battling to take dealers away from the other fellow, we might be better off in the end . . .

"Trouble is, we begin to regard a dealer too much as one of the family after he has been with us a while. That has its advantages, to be sure; but every man knows how strong is the tendency to relax in the family circle, to forget the little courtesies and the generous acts which come more or less naturally when one has on his party manners. After all, a factory never can get quite as close to its dealers as a man is to his family—and yet more than one family has finally been broken up by just this failure to put the best foot forward when in contact with the home circle. Our wives like candy and flowers after, as well as before, we marry them."

Too Bright an Outlook Has Hampered Comeback

"GREAT harm was done our business structure early this year when the idea was generally promulgated that business would be back on the upgrade by May. The harm came about, not merely because the prediction turned out to have been incorrect, but because it made a lot of business men rest on their oars and curtail their activities with the thought that they could ride back to prosperity on a wave of general business increase within a month or so."

The speaker was the chief sales executive of one of our largest automobile companies. He spoke without rancor, but with a vigorous positiveness to the small group of business friends seated around the dinner table.

"What is 'general business' anyhow?" he went on. "It's just the sum of the individual activity of each of our businesses. As a result, then, of a lot of us having waited to be wafted back to prosperity as a part of 'general business,' sales declines have been probably one-third to two-thirds greater than warranted on the basis of actual income decline throughout the country."

Progress Making Prophecies Come True

JUST ran across the manuscript of an article which we wrote for *Automobile Trade Journal*, back in the fall of 1927. Unpublished, finally, for lack of space, it made a number of predictions and comments about the future.

It prophesied greater progress in beauty of body design in the next five years than in the last five. Nearly three of the years have passed. Advances haven't been as great as might have been expected with the high-priced artists who were being attached to automotive concerns at that time. But we think definite progress has been made and that the prediction will be found to have come true.

It prophesied that no factory ever again would go volume-crazy with its eyes closed. None has—even with its eyes open.

It said that factory sales executives would travel more than ever; that their chief work during these travels would be information-gathering rather than speech-making. "The day of speech making tours is pretty much passed; information-gathering is the rule now." Maybe the wish was just a bit father to the thought there; what do you think?

A Prophet's Tough Break

A PARAGRAPH about retail financing was interesting to read over. "Factory subsidizing of finance company rates," it read, "is becoming a bit more widespread again, following a period when the practice seemed likely to go entirely into the discard. There is good reason to believe that it will be discarded even yet, but, so far as the immediate future is concerned, there probably will be more rather than less factory subsidies." Perhaps there wouldn't be much change in that comment if it were being written today instead of back there in 1927.

And certainly we could still—and probably for many years yet to come—write truthfully a paragraph about dealer bookkeeping which started off: "Ways and means of helping dealers to keep better and more accurate books are being promoted vigorously by a number of factories." . . . And so goes the way of a prophet.—N. G. S.

Speed With Safety Reached Through Regulated Racing

For a quarter-century the A.A.A. has nurtured contests for the betterment of the industry - - - - -

By Thomas P. Henry
President
American Automobile Association

FOR a period of more than a quarter of a century, the American Automobile Association has through its Contest Board nurtured and regulated official automobile racing in the United States.

During that time the Contest Board of the American Automobile Association has zealously safeguarded the traditions of our tracks, speedways and drivers. The contributions all have made and the fine plane on which racing obligations have been discharged are all but universally acknowledged and acclaimed.

And yet, from time to time, when a fatal racing accident occurs, we hear a variety of cries: "Stop racing! What good comes of it? Why is the American Automobile Association interested in its promotion? How does the public benefit? Why strive after greater speed?"—and other exhortations in similar vein.

We cannot stop racing if we would! We cannot stop the search for new records on land, on the sea, and in the air, as long as youth contemplates the performances of the past and as long as adventure stirs. We may issue bans; we may cease regulation and wholesome supervision; but some unknown boy will some day go it alone, driven by the eternal instinct that no speed is so swift that it cannot be beaten, no performance so brilliant that it cannot be surpassed.

The racing interest of the American Automobile Association dates back to the time when the automobile was emerging as a more or less dependable means of transportation. The engineering experts of the world have spoken so often and so convincingly of the contributions that racing has made to the automobile that it is unnecessary to go into details.

It is safe, however, to say that there are few of the major features of the car of today that did not get their baptism of fire in the grueling contests of the race tracks. It has unquestionably been the most exacting of all automotive laboratories.

This is justification enough for our interests in racing in the past, but what about the future? Let us simply remember that car evolution is far from finished. The car of the future will be built and racing will, as of old, continue to make its vital contributions. There can be no doubt at all that the car of today is safer than its predecessors. Nor can it be doubted that the lessons learned by racing drivers—lessons often bought at the risk of life and limb—went into the creation of that greater safety that you and I enjoy.

Racing has done more than any other agency to develop the possibilities of speed with safety. And much of the criticism of speed and speed tests is made by people who think of it as an abstraction and without relation to the march of human progress. Let us not forget that the wheel, from the first crude and unshapely thing fashioned by burning a hole through a segment of a tree trunk, down to the present day, has represented in no small way the advancement of civilization

(*Turn to page 61, please*)

Speed with a larger safety margin has increased the average day's run from 100 miles to 234 miles in ten years.

Oil Spray Research Suggests Basic Factors

This is the last of a series of three papers on the fuel aspects in oil engine developments from papers delivered at State College, under auspices of the A. S. M. E. last month

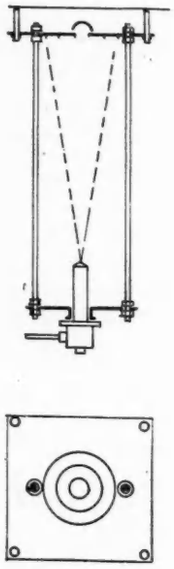


Fig. 1 (above)—Simple device for testing the concentricity of sprays

FORMULAE and data applicable to the design of fuel injection systems for oil engines was given in detail at the recent National Oil and Gas Power Meeting at State College, Pa., by Prof. P. H. Schweitzer, of Pennsylvania State College. His paper, entitled the "Factors Affecting Nozzle Design in Light of Recent Oil Spray Experiments," outlines the subject under four headings: Metering, Timing, Injecting and Spraying.

Under the title of "Metering" he says:

For short orifices with a length of up to, say, four times the diameter, the formula

$$v = c\sqrt{2\frac{l}{g}\frac{P}{e}}$$

can be used, taking $c = 0.80$ when the edges, both in and outgoing, are slightly chamfered. The discharge increases with the square root of the pressure and is independent of the viscosity. That means that for heavy oil and light oil the same orifice can be used and the discharge will be equal.

For very long orifices the Poiseuille formula should be used

$$v = \frac{pgd^2}{321n}$$

according to which the discharge decreases proportionally when the viscosity of the liquid increases. Now the same nozzle orifice cannot be used for various oils. The heavy oil requires a wider orifice.

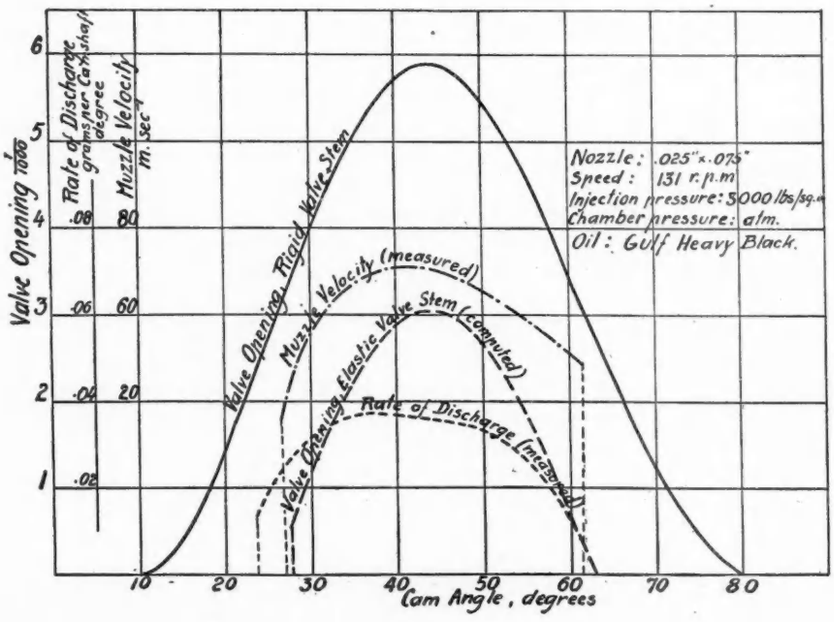


Fig. 2 (right) — Valve lift, muzzle velocity and rate of discharge

for Designing Diesel Engine Nozzles

By Edmund B. Neil
Director of Research,
Chilton Class Journal Co.

For medium long orifices, say, 4-10 diameters, the square-root formula may be used with a viscosity correction

$$v = c' \sqrt{2g \frac{p}{e}}$$

where

$$c' = \frac{1}{\sqrt{\frac{\frac{32}{d}}{R} + 2m}}$$

R is the Reynolds number and m is a constant with a value of 0.5-1.3.

A practical conclusion is to eliminate the use of nozzle orifices longer than four times the diameter. Then with a change of oil or a change of temperature it is unnecessary to change the orifice in order to get similar discharge. The discharge of chamfered short orifices can be calculated with the formula

$$W = 0.80a \sqrt{2g \frac{p}{e}}$$

(Notations: v, jet velocity; c, coefficient of velocity; g, acceleration of gravity; p, pressure drop; e, specific gravity; d, orifice diameter; l, orifice length; n, coefficient of viscosity; c', coefficient of velocity with viscosity correction; $R = dv$, Reynolds number; m, Couette's constant; W, volumetric discharge.)

Another suggestion is not to use square-edge orifices, but always to give a slight chamfer to the edges. The author tried to use geometrically square-edged orifices in order to get reproducible results, but found that the discharge through square-edged orifices varied more than the discharge through chamfered orifices. Small differences in the angle and depth of the chamfer don't make as much difference as unavoidable burrs and irregularities in the square orifices. The author stopped using square-edged orifices even for scientific experiments. In production, a chamfer of 0.004-0.005 in. at least, should be applied.

For determining the diameter of the orifice hole the most practical method is to use a low-power microscope. Every shop which has anything to do with Diesel nozzles should have a microscope of 20-30 magnification. With that, one can quickly determine not only the diameter of the hole, but also see how perfect the hole is. It is no exaggeration to state that a good portion of the Diesel orifices in use should not be in use; they should have been rejected before the assembly because the holes are crooked, out of round, or partly clogged with metal chips, etc.

Another good shop tool is a simple device shown by the sketch in Fig. 1. A target made of blotting paper with a 1-in. diameter hole in the middle is placed

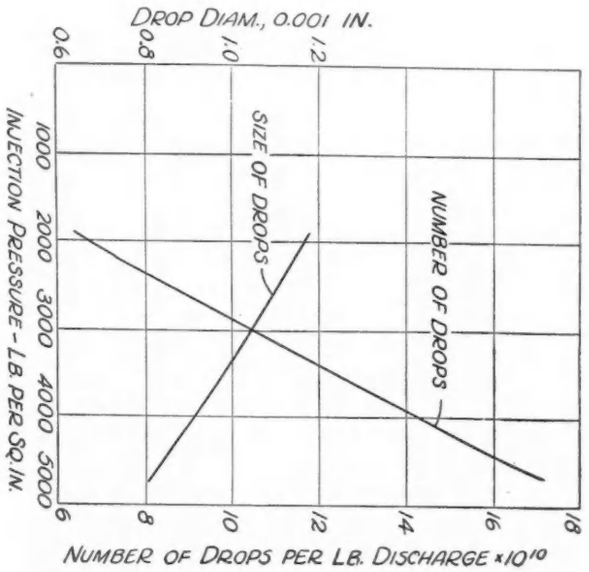


Fig. 3—Relation between drop size and injection pressure. Chamber pressure 145 lb. per sq. in. Orifice 0.024 in. diam.

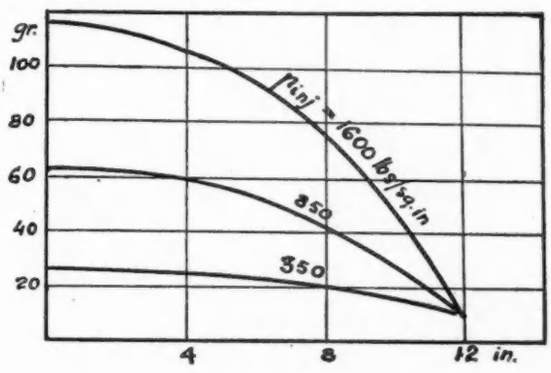


Fig. 4—Riehm's curves for the relation between dynamic pressure and penetration. (Orifice diameter, 0.305 mm.; orifice length, 1.0 mm.; chamber pressure, 300 lb. p. sq. in.) - - - - -

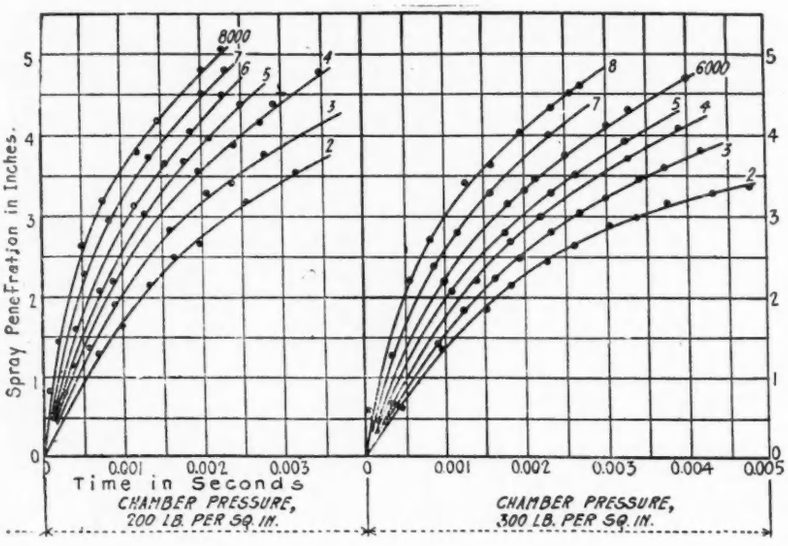


Fig. 5—N.A.C.A. curves for the relation between injection pressure and penetration - - - - - - - -

concentrically with and about 20 in. distance from the spray nozzle. One shot against such a target shows whether the nozzle shoots reasonably straight or is off. Every single nozzle should be tested for concentricity before putting it into an engine, because defectives are very common.

Timing

Through close measurements it was found that the cam profile is a more innocent element than it was thought to be.

On Fig. 2 the upper curve shows how the needle of the cam-actuated spray valve would have moved had it followed the cam. The rate-of-discharge curve and the muzzle-velocity curve, both of which were determined experimentally, show that the valve opened about 17 deg. later and closed about 17 deg. earlier than it was supposed to, and the valve lift was also correspondingly smaller. This discrepancy was traced to the elastic compression and expansion of the valve stem.

The elastic compression of the valve stem in the course of the injection was computed and the dotted curve obtained for 3000-lb. injection pressure as the theoretical valve lift. It sufficiently checks with the observations.

The beginning of the rate-of-discharge curve is significant. Instead of starting at zero it starts at a high rate of discharge, indicating that the valve opened suddenly rather than gradually, the cam profile being a gradual curve. What caused the sudden opening? Before the valve opens, the oil pressure acts on a ring surface which is between the stem diameter and the seat diameter. When the valve opens the oil gets behind the seat and exerts an additional pressure on the valve stem. This increase in pressure is practically instantaneous, and causes a sudden push-back of the valve stem with a corresponding sudden discharge. This push-back is quite appreciable even with mechanically operated valves unless the valve stem is rather rigid.

With the valve used it figured as 0.0005 in. at 3000 lb. pressure as shown on Fig. 2 and offers a partial explanation for the sudden initial rise in the rate-of-discharge curve. With spring-loaded valves this push-back of the stem should be more pronounced, and suggests an explanation for a common annoyance in connection with solid-injection Diesel engines.

Attempts to eliminate undesirable high maximum pressures by changing the fuel-cam profile did not meet with much success. Making the seat smaller and the valve more rigid is likely to produce the desired effect.

Injecting

For proper atomization injection is considered satisfactory if the jet breaks up right away when leaving the spray nozzle. This requirement holds for the narrow cone sprays used in conjunction with precombustion chambers as well as with direct spraying. In order to have the spray already atomized when leaving the nozzle, a spray-tip velocity is needed of not less than 120 ft. per sec., or an injection pressure of not less than about 1000 lb. per sq. in. for gas-oil, and for heavier oils more. If the injection pressure is insufficient there is a solid core of a certain length, which is undesirable. If the injection pressure drops at the end of the injection there is after-dripping.

In direct-spray injection the jet should not only be broken up but atomized into sufficiently small globules. According to Dr. Sass, to have good combustion in the A.E.G. engines, 20 per cent of the globules should be not larger than 0.0002 in., 30 per cent not larger than 0.0006 in. and preferably none larger than 0.002 in. Such an atomization can be obtained with an injection pressure of 4000 lb., a chamber pressure of 150 lb. (cold), and an orifice diameter of 0.024 in. The globule sizes decrease with an increase in injection pressure. The number of globules per unit weight of fuel seems to be in direct proportion to the injection pressure, as shown on Fig. 3, most of the increase being in the small droplets. The average globule diameter for 3000 lb. is about 0.001 in. which is a good figure to remember.

For other pressures it may be calculated from the relation mentioned. The drop sizes also decrease with smaller and shorter orifices or with centrifugal nozzles, but not very appreciably. For high-speed engines or engines with little or no turbulence a finer atomization is needed to accelerate combustion. The proper way to obtain it is by increasing the injection pressure. Heavier oils require higher injection pressures to produce the same atomization.

Spraying

If there is no turbulence the oil spray has to fit the combustion chamber; if there is turbulence it has to suit the turbulence.

An oil spray of 6000 lb. injection pressure in 200 lb. cold air (the density of which corresponds to 450 lb. hot air) will travel 28 in. With 1000 lb. injection pressure the penetration is about the same. In atmospheric air that spray shoots across the laboratory.

The fact that the spray penetration, precisely the total length of a horizontal spray, is independent of the injection pressure was discovered by Dr. Riehm six years ago (see Fig. 4). The Langley Field experiments, on the other hand, showed the penetration to increase with the injection pressure. That is, at least, the common interpretation given to the N.A.C.A. data, as shown on Fig. 5. Dr. Sass in his book pointed out the apparent discrepancy between Dr. Riehm's and the N.A.C.A. results and believed the former to be incorrect.

In the author's experiments intermittent injection was used instead of continuous injection, which was the strongest objection against Riehm's tests. The momentum of the spray (mass times velocity) was measured at various distances with the De Juhasz recording ballistic pendulum. A sample set of curves is shown in Fig. 6, the rest are similar. It will be seen that the momentums drop off about in proportion to the distance, very rapidly at 300 lb. chamber pressure, but unnoticeably at atmospheric pressure. It will be seen that the momentum lines for various injection pressures intersect the horizontal axis practically in the same point. The distance of zero spray momentum, which is nothing else than the total penetration, is 23 in. at 300 lb. chamber pressure, 25 in. at 200 lb., 29 in. at 100 lb., and very long at atmospheric pressure, but the injection pressure does not seem to have much of an influence. The explanation is that the high-pressure spray is atomized into much finer droplets and the higher initial velocity is counteracted by higher air resistance.

These tests vindicated Dr. Riehm. Are then the N.A.C.A. tests incorrect? They are not, if interpreted correctly. The N.A.C.A. penetration curves are plotted against time. If by drawing tangents to the penetration curves, velocity is plotted against penetration, the curves shown in Fig. 7 are obtained. They appear quite convergent. It is conceivable that the curves for different injection pressures would have met on the abscissa axis if the Langley apparatus had been suitable to follow them so far. That checks with Dr. Riehm's and the author's results.

The difference in the curvature of the curves between Riehm's, Langley Field's and the author's experiments can be explained easily. Riehm worked with a continuous spray and the air set in motion kept the jet from losing much speed near the nozzle, therefore the curves are convex. At Langley they photographed the spray tip, the velocity of which is in the beginning slower, later faster than the mean spray velocity.

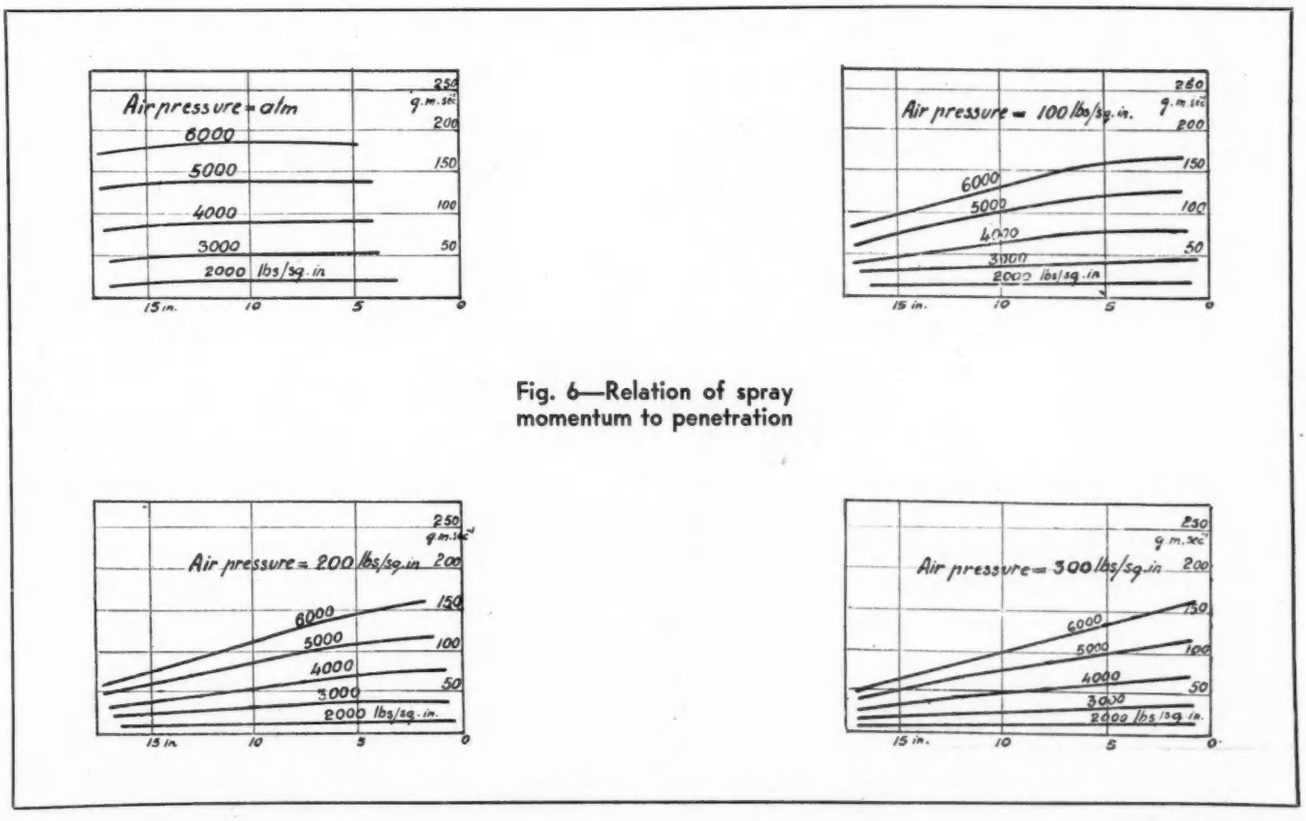


Fig. 6—Relation of spray momentum to penetration

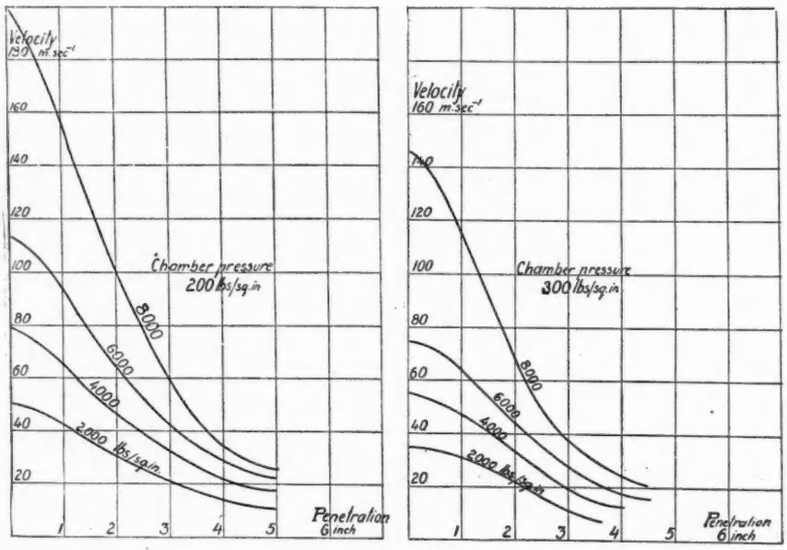


Fig. 7—N.A.C.A. curves replotted, showing decrease of velocity with penetration - - - - - -

Therefore, the curves start out convex and become later concave. The author measured what amounts to the mean velocity of an intermittent spray and obtained approximately straight lines.

High-pressure sprays and low-pressure sprays travel about the same distance in compressed air, but the high-pressure sprays travel faster. Therefore to obtain deeper penetration the increase of the injection pressure will not help much, but an increase in orifice dimensions will. However, in case of a high-speed engine the total penetration distance does not tell the whole story. The spray should penetrate and penetrate quickly. In order to make it penetrate more quickly and also to ignite more quickly an increase in injection pressure is quite in order.

Dispersion

To secure good combustion the space distribution of the spray is most important. In a non-turbulent type of combustion chamber the ideal is to distribute the oil in the combustion space so that it reaches every single oxygen molecule there is. On the other hand, every part of the spray should be kept from hitting any surface which is below a certain temperature where it could coalesce or crack. In a turbulence-type of combustion chamber the spray has to be directed so that it meets the air flow systematically.

Little information was available on spray dispersion when the author started experiments. At the suggestion of Prof. De Juhasz, to determine the spray distribution, various parts of the spray were caught in a cage holding segments of blotting paper located at various distances and angles like the stops of a spiral stairway. Weighing the blotting paper before and after injection, the difference indicates how much fuel passes the area represented by the blotting paper.

Results obtained by the dispersion tests show that the spray is much wider and shorter in dense air than in the atmospheric, with simple cylindrical nozzles. In atmospheric air at a distance of 12 in. from the nozzle,

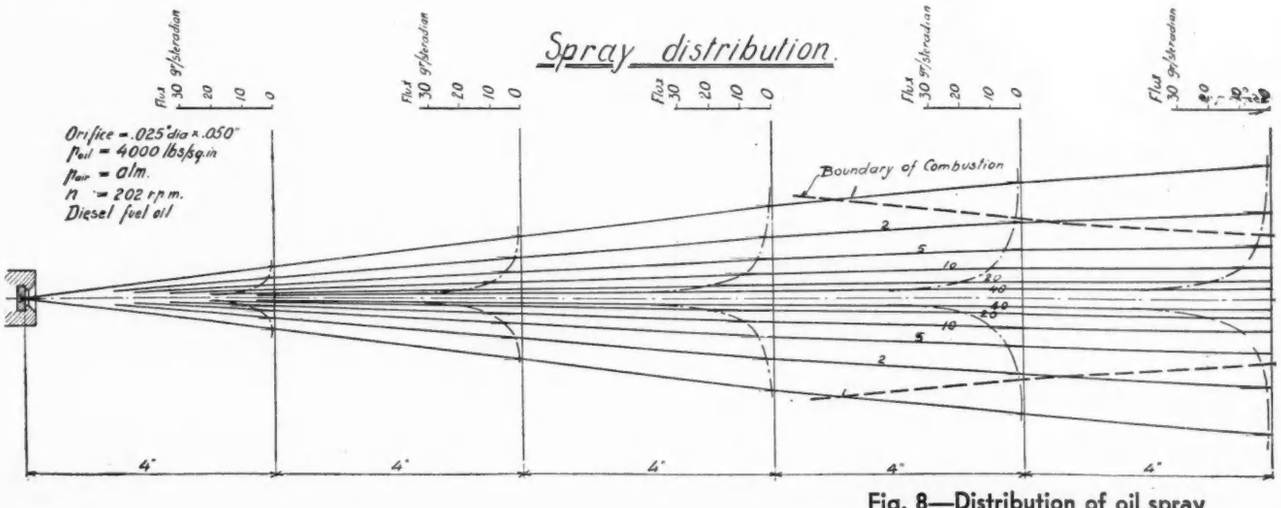


Fig. 8—Distribution of oil spray injected into atmospheric air

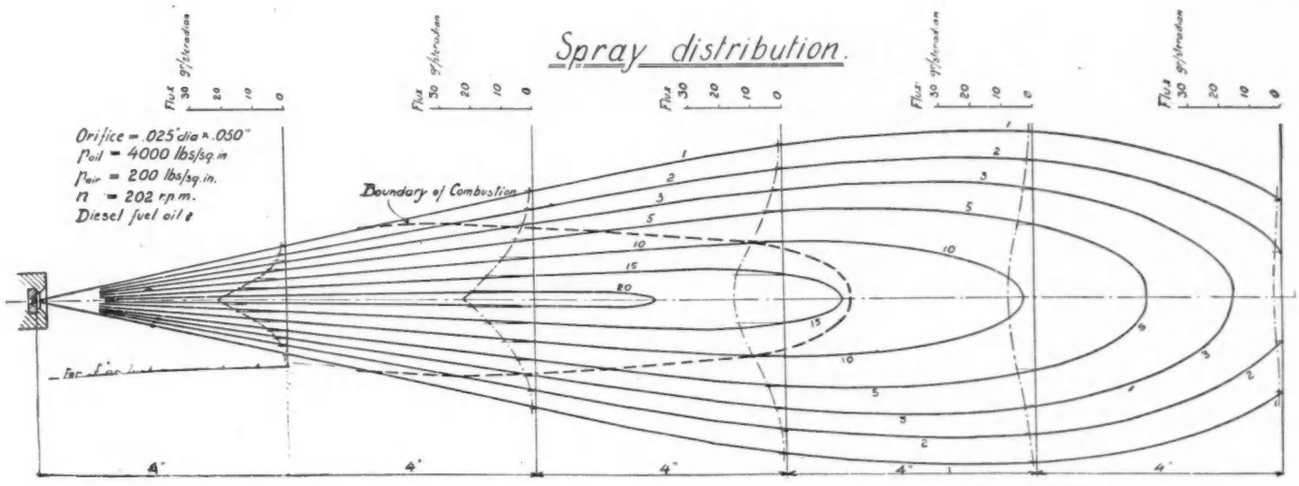


Fig. 9 — Distribution of spray injected into compressed air at 200 lb. p. sq. in.

57 per cent of the total discharge is still within a 1-in. circle, while in 200 lb. air this percentage is only 8.7. Dispersion tests in the atmosphere have little value.

Fig. 9 gives a clear idea of the spray in compressed air. This refers to a Diesel oil spray at 4000 lb. injection pressure, 200 lb. chamber pressure, and atmospheric temperature which is produced with a 0.025 x 0.050 in. orifice. A similar picture can be drawn for any spray nozzle and any operating condition. The author's spray is about 20 in. long and has a cone angle of about 25 deg. The heavy lines connect points having the same flux or angular density.

If the oil particles would neither evaporate nor be deflected by gravity, the flux lines would be straight and represent the path of flight of the particles.

The envelope of the spray would then be a cone, like Fig. 8, which shows the same spray in atmospheric air. With the actual spray in dense air this is approximately true near the nozzle, for about 8 in. distance with the author's spray. Then the gravity and evaporation makes itself felt more. The particles on the periphery evaporate or drop and the spray begins to "converge." It also becomes less and less dense and in 20 and some inch distance it vanishes.

The spray illustrated has a total weight of 1/280 lb. and contains, according to Dr. Sass' measurements, 525,000,000 droplets of from 0.0002 to 0.0015 in. diameter, which together have a total surface of 5.4 sq. ft.

It should not be inferred that the spray as shown represents the actual spray formed in the engine. The lighter portions will undoubtedly be torn apart by some turbulence. Some particles will burn before they get very far. In a low-speed engine a good portion of the fuel burns before the injection is over.

While traveling in hot air the oil particles burn. The dotted line marked "Boundary of Combustion" marks the traversed distances before all of the oil burns. The adjacent oxygen is just sufficient to burn the respective layer of oil, under the assumption that combustion begins at the nozzle with zero ignition lag and proceeds in a stagnant air, free of turbulence. Therefore the rotational surface corresponding to the "boundary of combustion" is the "theoretical combustion chamber" the envelope of a theoretical combustion. But from a theoretical combustion chamber practical conclusions may be drawn. Spray interferences in a multi-spray engine should be avoided in or near the boundary of combustion if we don't want the drops to starve for the lack of oxygen. Further away a spray interference is not so objectionable.

Speed With Safety

(Continued from page 55)

as we know it. The wheel is surely the symbol of progress.

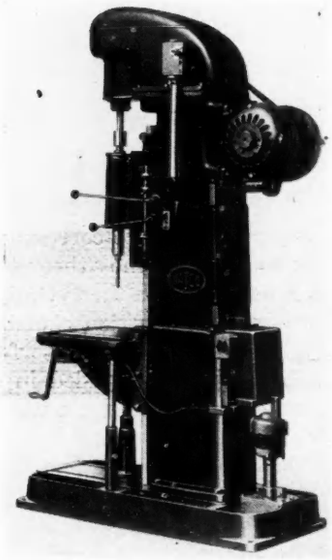
Speed and greater speed has set the tempo of our age. Ten years ago the average day's run of the motor tourist was 100 miles. Last year the average day's run was 234 miles. Great speed, with a larger margin of safety, has given us a mobility which is one of the most important factors in American life today. It has eliminated boundaries, isolation, and has made for a wider distribution of national wealth. The public is interested in the contribution of racing to engineering development, in cheaper and safer cars; but it is also interested in racing as a sport. All that need be said in this respect is that here is one major American sport that the breath of scandal has never touched down through the years.

It is sometimes urged that these drivers are reckless adventurers in quest of profit and fame. It is far more true to say that this type of recklessness and ambition are the rarely minted coins which all heroes pay out with a superb gesture to the high gods of adventure in the hope of buying human advancement. Across the desert of mediocrity stretches the path of progress, a path often whitened by the bones of heroes who have gone a little further than their predecessors.

NEW DEVELOPMENTS—AUTOMOTIVE

Natco Single-Spindle Driller

A DRILLING capacity of 1¼ in. drill in steel at 75 f.p.m. and a speed range of 100 to 1300 r.p.m. of the driveshaft are provided by the Natco Model B 225 H single-spindle driller with semi-automatic feed, recently announced by the National Automatic Tool Co., Richmond, Ind.

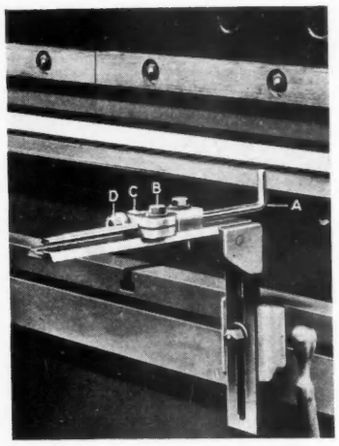


Hydraulic pressure is supplied by a constant volume pump which is protected by a relief valve set at 300 lb. per sq. in. The operating cylinder is of the pull type, having a total feeding pressure of 3400 lb. when the pump is under maximum load. The hydraulic operating valve is of the balanced-piston type and is located above the oil reservoir. The operating valve trip mechanism for the feed is of the load-and-fire type, operated semi-automatically through adjustable dogs which cause the head to go through its cycle of rapid traverse down to the work, feed for the drilling operation, rapid traverse up and away from the work and stop at the end of the stroke, the operator only starting the cycle by means of a manually operated hand lever.

The driving motor is 5 hp. capacity at 1200 r.p.m., with electrical equipment consisting of push buttons and a magnetic switch providing overload and low voltage protection. Standard current specifications are three-phase, 60-cycle, 220 and 440-volt A.C. Floor space required, 26 x 50 in. Net weight, 3650 lb.

Universal Press Brake Gages With Micrometer Attachments

WHAT is said to be the first universal gage with micrometer adjustment for press brakes has been placed on the market by The Cincinnati Shaper Co., Cincinnati, Ohio.



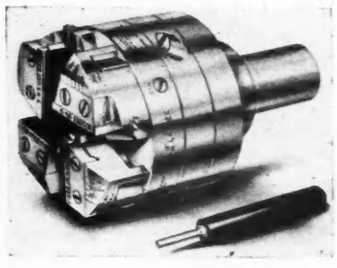
This gage has full horizontal and vertical adjustment and may be used either on the front or the rear of the press. Horizontal gage rod "A" can be quickly moved to the approximate gaging position and clamped in place with cap screw "B." Final adjustment is then made with micrometer nut "C" and lock nut "D." The gage can be set for forming wide or narrow sheets either upward or downward. It can also be used as an adjustable two-step gage for making both bends of a channel successively with only one handling of the sheet. Gage rod "A" may be replaced with any ½ in. diameter rod. This can be notched for a step gage or bent to any desired shape for gaging a special bend.

Heavy-Duty Grinder

THE Hammond Machinery Builders, Inc., Kalamazoo, Mich., have added the Type W heavy-duty production grinder in 5 and 7½-hp. capacity. This machine is similar in design to the smaller sizes recently announced.

Landex Head is Internally Tripped

THE internally tripped Landex Head in sizes from 3/16 to 2-in. diameter thread has been placed on the market by the Landis Machine Co., Waynesboro, Pa.

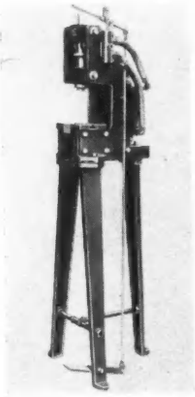


The internal tripping attachment makes it applicable for close-to-shoulder threading on work which varies in length and on work where a uniform length of thread

PARTS, ACCESSORIES AND PRODUCTION TOOLS

is required. It is also well adapted for threading operations where a fixed stop cannot be used to open the die head, or where the work is held loosely in a fixture, as on a drill-press table.

The tripping mechanism consists of a plunger held in the shank of the head, the shank being drilled and tapped to accommodate it. The plunger is adjustable and can be set to any thread length within the capacity of the head. When used on automatic screw machines, this head eliminates the necessity of accurate timing of the head-opening cam, as the head is positively tripped when the end of the work comes in contact with the tripping plunger.



Hopkins Air-Operated Arbor Press Line

A NEW line of air-operated arbor presses available in 1000, 4000, 6000 and 12,000 lb. sizes is announced by the Tomkins-Johnson Co., Jackson, Mich. They may be secured for either hand or foot operation. The ram has two bearings which enable the ram to work up and down in a vertical position. Tools can also be bolted to the table by use of T slot. The adjustment of the ram is made by a "U" washer of suitable thickness which eliminates a thread on the ram for adjusting purposes.

Hercules Right Angle Nut Driver

A PORTABLE air-driven nut setter particularly adapted for close quarters has been placed on the market by The Buckeye Portable Tool Co., Dayton, Ohio, under the trade name, 017-5 Right Angle Nut Driver. It is furnished in two speeds, 660 and 1000 r.p.m., and has a capacity of ½ in. for nuts and ⅝ in. for capscrews.

This tool is 21 in. long and weighs 11¼ lb.

Brownie Coolant Pump

A VERTICAL coolant pump, especially adaptable for centerless grinders, is announced by the Tomkins-Johnson Co., Jackson, Mich. This centrifugal pump uses no packing and is said to be trouble-proof, with no possibility of clogging. The No. 1 has a capacity of 50 gal. per minute with a maximum lift of 15 ft., a ½-hp. motor, used with direct motor drive, and a speed of 1725 r.p.m. The height overall is 19⅝ in. The outlet pipe is 1¼ in.

The No. 2 pump has a capacity of 15 gal. per minute, a maximum lift of 10 ft., a ¼-hp. motor, a 1-in. outlet pipe, height, including motor, 19⅛ in.

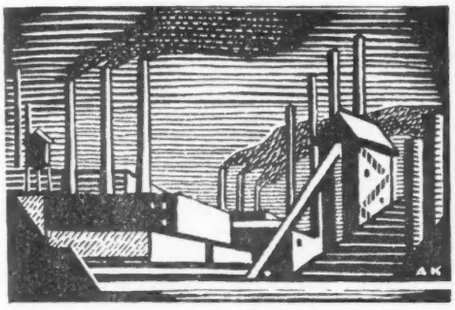
This pump handles a heavy mixture of coolant with grit or chips as efficiently as it does clean oil. It is furnished with the motor or with driving pulley, if desired, and can be made in acid-resisting metal.

Promal Drive and Conveyor Chain

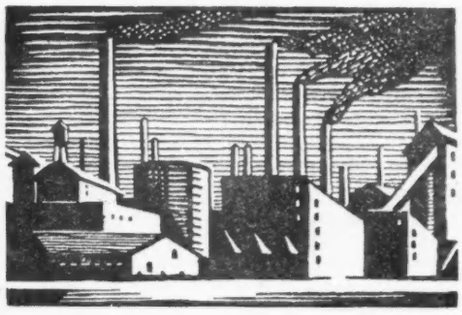
PROMAL, a recently developed metal, said to possess unusual strength and durability for a cast product, is used in making the line of conveyor and drive chains added by the Link-Belt Co., Indianapolis, Ind. These chains are particularly recommended for four general classes of service: (1) chain drives, elevators and conveyors operating under gritty or abrasive conditions; (2) chain drives where greater strength is required than the corresponding size of malleable iron chain provides; (3) drag, scraper and flight conveyors where the chain drags and is subject to abrasion, and (4) heavy-duty drives of comparatively high speed, short centers and large sprocket ratios.

Automotive Oddities — By Pete Keenan

A BULL FIGHT WAS STAGED RECENTLY IN MEXICO TO RAISE FUNDS FOR ROAD BUILDING.
San Luis de la Paz, 1930.
Pete Keenan
MRS. ALBERT STEWART — THE ONLY WOMAN AUTOMOBILE RACE SCORER WITH THE A·A·A·— AND ONE OF THE BEST.
EXASPERATED AT THE CARELESSNESS OF A WOMAN DRIVER, JOHN SORDER YANKED HER FROM HER CAR AND SPANKED HER.
Hanford, Cal. June, 1930.
BOTH THE CADILLAC AND THE LA SALLE CARS ARE NAMED AFTER FRENCH EXPLORERS OF NORTH AMERICA.
MOSQUITO NETTING HAS TO BE WORN IN FRONT OF RADIATORS IN KENYA, EAST AFRICA, TO KEEP GRASS SEEDS FROM STOPPING UP THE HOLES.



NEWS OF THE INDUSTRY



Nash Cuts Dividend, Increases Reserve

First Quarter Earnings Were $1,932,896—70 Cents a Share

CHICAGO, July 9—Directors of Nash Motors Company yesterday placed the company's common stock on a $4 a share annual dividend basis by the declaration of a quarterly payment of $1 a share, to be made Aug. 1 to holders of record July 1. The new dividend basis of $4 a share represents a reduction of $2 a share annually from the

(Continued on page 66)

May Sales Off 3 Per Cent

PHILADELPHIA, July 10 — May sales of new passenger cars were three per cent behind April and 24 per cent behind May, 1929, according to final registration figures. For the first five months of the year, domestic sales were 21 per cent smaller than in the same period last year. Ford is three per cent ahead of 1929 in the first five months, while all other makes combined are 32 per cent off. May registrations of new cars totaled 345,000, of which 143,500 were Fords.

Chevrolet Names Woodmancy

TOLEDO, July 10 — S. A. Woodmancy, formerly manager of the Bay City plant of the Chevrolet Motor Co., has been named manager of the Toledo plant, effective on July 15. He succeeds George D. Moore.

Fisher Body Strike Ends

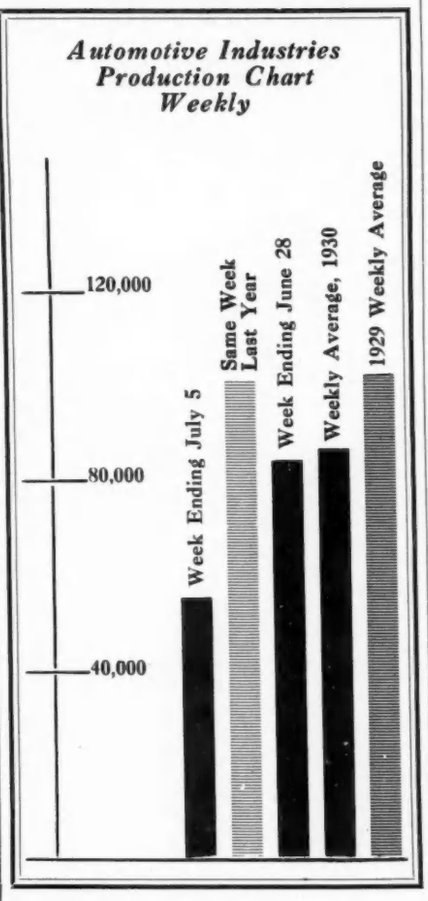
DETROIT, July 8—Officials of the Fisher Body Co. plant at Flint, Mich., today indicated that the strike, which began when employees of one department walked out last Tuesday, was ended.

Ford Buys in Toledo

TOLEDO, July 10—Forty-five Toledo plants are now making parts and furnishing materials for the Ford Motor Co.

Detroit Dealers Close on Sunday

DETROIT, July 7—Sunday closing became effective among automobile dealers in Wayne County yesterday.



Elkhart-Lever Merger Officially Announced

INDIANAPOLIS, July 10—With the granting of approval by the Indiana Securities Commission, the Elcar Motor Co. of Elkhart, Ind., and the Lever Motor Corp. of Delaware, publicly announced a merger of the two firms. The new firm will be known as the Lever Motors Corp. of Indiana. The two parent concerns, for the present, will operate as divisions of the merged company.

The Elcar company will continue to operate under its old name. The general offices of the new company will be moved from Oak Park, Ill., to Elkhart, Ind., according to the announcement, and as soon as possible the manufacturing plant of the Lever Motors Corp. will be moved from Quapaw, Okla.

Plane, Motor Sales Close Upon Output

Result of Lowering Production to Estimated Prospective Market

NEW YORK, July 9—Production of airplanes during the first quarter of the current year was stepped down to meet the prospective market as indicated by general business conditions, and the result has been a very close relationship between production and sales, according to figures released by the Aeronautical Chamber of Commerce of America, Inc.

Seventy-eight major aircraft companies produced 630 commercial and military planes during this period, representing a total value, less motors, of $4,569,713. Of this production, 501 units were designed for the commercial

(Continued on page 66)

Chrysler Forms Subsidiary

DETROIT, July 8 — The Chrysler Corp. has announced the establishment of the Amplex Mfg. Co. as a subsidiary, of which E. S. Chapman, formerly operating manager of the Chrysler plant at Newcastle, Ind., is general manager. The new company, which will operate the Newcastle plant, will promote the development of the corporation's marine and industrial motor activities and will handle and sell such other products now allied with Chrysler manufacturing activities as are applicable to other industries.

Chrysler Ships 28,407

DETROIT, July 7—June shipments of Chrysler-built cars totaled 28,407 units, or 67 per cent of last year's June shipments. This is more than 1500 units in excess of the June, 1928, record.

Fred B. Thompson Dies

DETROIT, July 8—Fred B. Thompson, manager of the Detroit branch of the Federal Motor Truck Co., died at his home here yesterday after an illness of two weeks.

Ford of Canada Closes Two Weeks

DETROIT, July 8—The Ford Motor Co. of Canada, Ltd., closed its plant and offices in East Windsor for two weeks beginning July 1.

Dodge Sales Executive Staff is Realigned

In announcing the recent appointments of its new sales executives, Dodge Brothers has made known that closer contact between the dealers, field organization and factory is the keynote plan. The appointments of A. van Der Zee as general sales manager; W. M. Purves, passenger car sales manager; W. S. Graves, truck sales manager, and A. H. Ferrandou, bus and motor coach sales manager, were announced recently.

Sales operations by districts have been divided among three directors of sales as follows: W. J. Case—Detroit, St. Louis, Memphis, Kansas City, Oklahoma City and San Francisco; F. H. Akers—Boston, New York, Philadelphia, Pittsburgh, Washington, Charlotte, Columbus and Atlanta; D. T. Stanton—Chicago, Indianapolis, Louisville, Des Moines, Omaha, Denver, Minneapolis and Portland.

W. F. Clancy is assistant truck sales manager in charge of the Eastern division and K. A. Ridenour, with same title, is in charge of the Western division. H. J. New, as director of distribution, will continue to have distribution of all Dodge Brothers products; F. N. Sim is director of advertising, and W. R. Bamford continues as general service manager.

McKenzie is Appointed

Elmer C. McKenzie has been appointed assistant sales manager of the Ex-Cell-O Aircraft & Tools Corp., Detroit, according to an announcement of N. A. Woodworth, president and general manager. John E. Wells, who has been assistant sales manager, becomes advertising manager.

Irving Is Convalescent

Captain J. S. Irving, designer of the "Golden Arrow," is reported to have undergone a successful operation on June 17, and to be progressing satisfactorily at the hospital where he has spent the intervening time.

Airplane, Motor Sales

(Continued from page 65)

market, representing a value, less motors, of $3,187,423, which represents nearly 80 per cent of the total production in volume, or 69 per cent in sales price.

The same manufacturers sold 584 units during the period, with a value, less motors, of $4,150,219, of which 409 units, or 70 per cent of the reported sales representing a value, less motors, of $2,356,241, were commercial planes.

Twenty-two manufacturers of engines report production during the period of 900 for both military and commercial purposes, valued at $4,063,102. Of this production 514 engines, valued at $1,919,269, were designed for the commercial market.

Engines sold during this period totaled 916, with a value of $4,241,994, of which 452 engines with a value of $1,720,960 were sold to commercial companies.

P. H. Noland

Whose appointment as assistant general manager of the Marmon Motor Car Co., Indianapolis, was announced last week in *Automotive Industries*

Bendix Names Martin

Ralph H. Martin has been named assistant to Vincent Bendix, president of the Bendix Aviation Corporation. In his new position Mr. Martin will manage the Bendix realty holdings in Chicago which have a reported valuation of from $10,000,000 to $12,000,000. Mr. Martin resigned his position as loop manager of Baird & Warner, Inc., to accept the post with Bendix.

Sterling Reports Progress

Henry S. Sterling, field representative of the National Automobile Chamber of Commerce, who is now traveling in South America, reports enthusiastic reception of a film he is using showing exactly how to start and operate a motor car. He held 11 meetings in Venezuela with a total attendance of over 7000 people.

Nash Cuts Dividend

(Continued from page 65)

former rate of $6 a year, which has been in effect since early 1929. In 1927 and 1928 regular dividends of $4 were paid in each year, with a $1 extra in 1927 and a $2 extra distribution in 1928.

Following the dividend action, a statement of earnings was released by the Nash management, covering the three months ended May 31, 1930. In this period, after all charges, including depreciation, Federal income taxes, and allowances for special contingencies totaling $1,155,000 net income available for dividends was $1,932,896. This is equivalent to 70 cents a share on the 2,730,000 shares of no par value common stock which constitute the entire capitalization. In the corresponding three months to May 31, 1929, net income was $6,623,329 or $2.43 a share.

Gazley, La Sha Rejoin the Aeronautics Branch

Richard C. Gazley and Stanley S. La Sha, consulting aeronautical engineers, Washington, D. C., have been appointed chief and assistant chief respectively of the engineering section of the aeronautics branch, it was announced today by Clarence M. Young, Assistant Secretary of Commerce for Aeronautics. Mr. Gazley succeeds Kenneth M. Lane and Mr. La Sha succeeds Earl C. Friel, both of whom have resigned.

Both Mr. Gazley and Mr. La Sha have served previously in the engineering section of the aeronautics branch.

Since leaving the aeronautics branch they have been engaged in consulting aeronautical engineering work.

Mr. Lane has been chief of the engineering section since last July and Mr. Friel has been in the section since November, 1928.

Chrysler Appoints Hamilton

Announcement has been made of the appointment of H. M. Hamilton, formerly of the Chrysler Central Advertising staff, to the position of assistant advertising manager of the Chrysler Sales Corp., to succeed John M. Caron, resigned. Before his association with Chrysler, Mr. Hamilton was with Graham-Paige, engaged in sales promotional work, where he came following six years in advertising agency work.

Multibestos Names Rogers

Multibestos Co., Walpole, Mass., has announced the appointment of Mason T. Rogers as vice-president in charge of merchandising.

Mr. Rogers has been connected with the automotive industry since 1911. His early experience was in the retail end, since he spent several years with Packard in Philadelphia and Buffalo.

Sherwood Joins Lyon

Lewis R. Sherwood, who has for the past 19 years been associated with the automotive industry, has joined Lyon Metal Products, Inc., and will manage their Detroit automotive branch office.

Before joining the Lyon organization he was sales manager of the wood and metal parts division of the Baker Raulang Co., Cleveland, manufacturers of auto bodies.

Van Duzer to Represent U. S.

William A. Van Duzer, Harrisburg, Pa., president of the American Road Builders' Association, has been designated by the State Department as a representative of the United States on the Permanent Commission of the International Association of Road Congresses, according to announcement from the Department of Agriculture.

Born Joins Delco

Frank G. Born, formerly chief engineer of the Wahl Co., has accepted a position in the engineering division of the Delco Products Corp., Dayton, Ohio.

Cold Finished Steel Bars Hit New Low Price Level

Sheet Market Steady and Dull, Prices Weak

NEW YORK, July 10—The market for cold-finished steel bars has receded to 2 cents per lb. flat, the lowest price level in eight years. The regular market price on hot-rolled bars is now 1.65 cents, Pittsburgh, the 35-point spread between the hot-rolled and cold-finished being subnormal when compared with the average of a few years ago, but slightly higher than the average spread in the last two years.

Whether the 1.65 cents price for hot-rolled bars represents the bottom in the market's downward readjustment is a matter of much speculation. There is no really representative tonnage business being booked.

While the sheet market is perhaps no stronger than it was before the Fourth, it certainly is no weaker. There are still mills that would book round lot orders for black sheets at as low as 2.45 cents, Pittsburgh, but the majority of producers are quoting 2.55 cents. New business in full-finished automobile sheets is light.

Pig Iron—In spite of foundry melt running low, blast furnace sales representatives note a slight improvement in buying for current quarter needs. The Michigan market continues at $18.50 @ $19.

Aluminum—The market in general has settled on a basis of 22.90 cents for 98 @ 99 per cent virgin metal, that being the price named by the domestic producer as well as importers. Remelted metal is quoted at 20 cents. In readjusting their scrap-buying prices to the lower primary market, secondary metal interests have slightly widened the spread between the various scrap and primary grades.

Copper—The market is marking time, consumption in all lines being very light.

Tin—The spot Straits market again broke to below 30 cents at the opening of the week, some sales at 29⅞ cents being made to consumers.

Lead—Quiet and steady.

Zinc—With the equivalent of three months' consuming requirements being reported as smelters' surplus stocks, the market is decidedly weak and at the lowest price levels in nearly a decade.

Kissel Plans New Cab

NEW YORK, July 7—Kissel Motor Car Co. is planning to introduce to New York about July 15 a new taxicab known as the New Yorker.

F. L. Rockelman

Whose appointment as president of the Plymouth Motor Corp. has been confirmed by Walter P. Chrysler, president, Chrysler Corp.

June Output Estimated

NEW YORK, July 10—Car and truck production during June has been estimated by the National Automobile Chamber of Commerce at 343,000 units. This compares with June production of a year ago of 567,424 units and brings the production for the first half year to 2,322,000, as compared with 3,413,304 units during the first six months a year ago.

Bus Bill Fails to Pass

WASHINGTON, July 10—The Parker motor bus bill failed of passage by the Senate. Though it was the unfinished business before that body when Congress adjourned last Thursday, opposition against it made it impossible to pass it and it did not come to a vote. The bill previously had passed the House. It is planned to bring it up early at the next session which meets in December.

Rockelman Appointment Confirmed by Chrysler

Heads Plymouth, With Sauerbrey as Vice-President

DETROIT, MICH., July 7—Walter P. Chrysler, president and chairman of the board of the Chrysler Corp., announced officially July 3 the appointment of F. L. Rockelman as president and general manager, and P. C. Sauerbrey as vice-president and operating manager respectively of the Plymouth Motor Corporation.

Mr. Rockelman has been associated with the Chrysler Corp. since April of this year as a member of Mr. Chrysler's personal staff. He had previously been connected with the Ford Motor Company since 1903. His experience in the motor car industry covers practically every phase of sales, production and service. Among his important executive responsibilities have been the reorganization of the Detroit, Toledo and Ironton Railroad and the direction of sales for the Ford Motor Company since 1927.

P. C. Sauerbrey has served with the Chrysler Corporation since 1926 in various executive positions in the manufacturing division. He was in active charge of building and equipping the new Plymouth plant.

Before his connection with the Chrysler Corporation, Mr. Sauerbrey was in charge of manufacturing at the Muncie Products division of the General Motors Corporation.

Cites Truck Efficiency

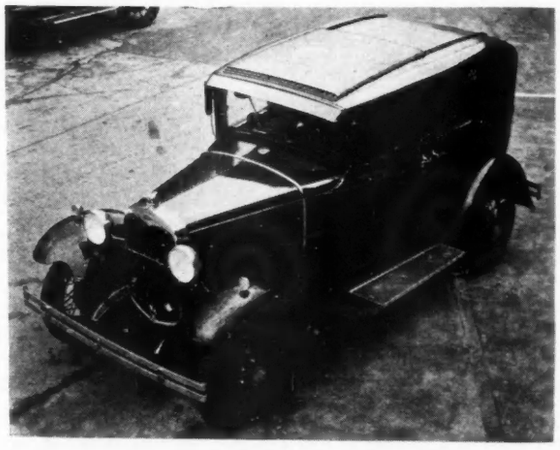
NEW YORK, July 8—Substitution of motor transportation at a cost of 30 cents per mile for railroad services on lines where the volume of traffic failed to justify the $1.75 per mile cost of such service has resulted in greater transportation efficiency, A. P. Russell, vice-president of the New York, New Haven and Hartford Railroad, declared at hearings of the Interstate Commerce Commission now being conducted in New England.

Ford Atlanta Plant Busy

ATLANTA, July 7—Officials of the Atlanta assembling plant of the Ford company report business as good for the past month and are optimistic over prospects for July. During June the Ford company, which assembles cars in Atlanta for the greater part of Georgia and Alabama, reports that it has sold slightly more than 50 per cent of all cars sold in Georgia and 54 per cent of all cars sold in Alabama.

Pennsylvania Cuts Gas Tax

HARRISBURG, PA., July 8—The gasoline tax imposed by the State of Pennsylvania was reduced from four to three cents last week in conformity with the provisions of the law which stated that the four cent rate should continue for one year only. It is estimated that the reduction in revenue for the following year will amount to $9,000,000.



The British vogue for the sunshine - roof sedan is capitulated to in this new Ford model for the English market. Front half of roof slides to rear aided by inside handle

Farmer Clips Lap Mark at Langhorne Track

Fred Frame Wins 100-Mile Event, Sets 50-Lap Record

Frank Farmer

LANGHORNE, PA., July 4—Two world's speed records for one-mile circular dirt track fell here today, during the progress of the Independence Day races at the Langhorne Oval. Driving a 91½ cu. in. Miller, Frank Farmer, Philadelphia, clipped nearly two seconds from the record lap time established by the late Frank Lockhart at Cleveland 3 years ago. Farmer's time for the mile was 37 2/5 seconds compared with the former record 38.94 seconds. The record time in m.p.h. was 96/70.

In the 100-mile event, Fred Frame, Los Angeles, also driving a 91 cu. in. Miller, lowered the record for fifty miles on the dirt track. At the start of the race Farmer's Miller set a blistering pace, only to retire at the end of ten laps. Frame then took the lead and held it consistently for the remainder of the race.

Herman Schurch, Hollywood, Calif., finished second, driving replacement for "Deacon" Litz, of Du Bois, Pa., and Billy Albertson, Penn Yan, N. Y., was third. Bill Cummings, Indianapolis, driving a Miller said to be the most expensive racing car extant, finished in fourth place after losing ten laps on account of faulty carburetor adjustment.

Wayne County Sales Drop

DETROIT, July 7—New passenger car registrations in Wayne County during June totaled 7428, a decrease of 2555, or about 25 per cent, from the total of 9983 in May, and a decrease of 8436, or about 53 per cent, from the total of 15,864 in June, 1929. The total registrations for the first six months of the year are 44,122, as compared with 77,687 for the first six months of last year.

Business in Brief

Written by the Guaranty Trust Co., New York, exclusively for AUTOMOTIVE INDUSTRIES.

NEW YORK, July 9—The warmer weather last week stimulated the sales of summer goods. Wholesale and jobbing trade showed no improvement over the dullness that has persisted in this line for some time. Slowness in several industries continued. Iron and steel production now averages around 60 per cent of capacity, as against 95 per cent a year ago.

FARM PRICE INDEX

The index of the general level of farm prices on June 15 stood at 123 per cent of the pre-war average, the lowest since October, 1922, which marks a decrease of 1 per cent below that a month earlier and a decrease of 12 per cent below that a year earlier.

CONSTRUCTION AWARDS

Average daily building contracts awarded in 37 Eastern States during June, according to the F. W. Dodge Corp., amounted to $24,022,900, as compared with $18,296,600 for May and $21,195,600 for the corresponding period last year.

CRUDE OIL OUTPUT

Average daily crude oil production for the week ended June 28 amounted to 2,610,950 barrels, as compared with 2,598,850 barrels for the preceding week and 2,815,400 barrels a year ago.

STOCK MARKET

With the approach of the holidays, the stock market was dull. Speculative activity was small and other trading was limited. There was a slight recovery in some of the active issues, but the general list showed a strong tendency to decline on a very small volume of sales. The volume of trading surpassed 2,000,000 shares on only one day during the week. Call money ranged from 2 to 3 per cent.

BROKERS' LOANS

Brokers' loans in New York City for the week ended July 2 decreased $197,000,000, while the decline for the four weeks ended July 2 amounted to $882,000,000.

FEDERAL RESERVE STATEMENT

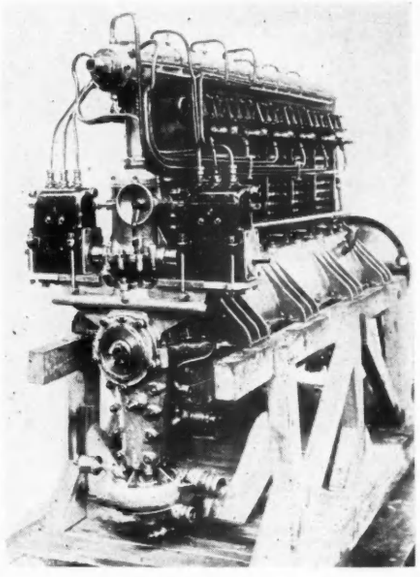
The consolidated statement of the Federal Reserve banks for the week ended July 2 showed increases of $28,000,000 in holdings of discounted bills, of $55,000,000 in holdings of bills bought in the open market, of $19,000,000 in holdings of Government securities, and of $15,000,000 in total reserves. The reserve ratio on July 2 was 80.7 per cent, as against 83.7 per cent a week earlier and 83.3 per cent two weeks earlier.

The Federal Reserve Bank of Philadelphia reduced its rediscount rate last week from 4 to 3½ per cent, and the Federal Reserve Bank of Boston reduced its rate from 3½ to 3 per cent.

Fiat Develops Diesel Type Aircraft Engine

Adapted From Preceding Gasoline Type

ROME, June 24—The first flight in Italy with a Diesel-engined plane has just been made from Turin to Rome by Renato Donati, on a machine built by the Fiat Co. of Turin. The Fiat heavy oil engine is a six-cylinder known as Model A.N. 1, which has been adapted from the firm's gasoline Model A 12 bis. It is a vertical type of 140 by 180 mm. (5.52 by 7.09 in.) bore and stroke, with steel cylinders having welded water jackets, mounted on an aluminum crankcase. Two overhead camshafts, driven by shaft and bevel gearing at the front, operate four valves per cylinder.



Fiat's New Diesel

Two fuel pumps, each one with three pistons, are mounted in place of the usual magnetos, on the base of the overhead valve operating gear. The right-hand pump distributes fuel to the three rear cylinders and the left hand pump feeds the three forward cylinders. The injectors are mounted vertically in the cylinder head. The mounting of the water and oil pumps has not been changed.

It is claimed that the normal power output is 180 at 1600 r.p.m.

Correction

In a news item on page 31 of *Automotive Industries* for July 5, the Erie Forge Co. is credited with constructing a giant steam drop-hammer. This was an error. The hammer was built by the Erie Foundry Co., as officials of the latter point out.

Pioneer Issues Manual

NEW YORK, July 8—Pioneer Instrument Co. has issued an eight-page Manual of Instructions for the use and maintenance of its various aviation instruments.

Endurance Flight Ends After Breaking Record

Airplane "City of Chicago" Aloft Continuously 553 Hours

CHICAGO, July 7—The endurance plane "City of Chicago," piloted by Kenneth and John Hunter, was forced down by a clogged oil screen after 553 hours 41 minutes and 30 seconds in the air, during which time the ship set a world's record for sustained, refueled flight.

The flyers headed for Sky Harbor airport at 5:21 Central Standard Time, July 4 when they found it impossible to fly longer without risking an accident. They had just received an emergency load of oil from the refueling plane "Big Ben," a twin of the "City of Chicago," and when they attempted to place the oil in the line it spurted out. Fearing a frozen engine they descended to a riotous greeting from a huge holiday crowd.

The oil screen of the ship which, according to government regulation, should be cleaned after every 20 hours of flying, had been cleaned only with the blade of a knife during the flight. Unfortunately the flyers were too low to throttle down their motor and clean the screen. They did try this but the oil, spurting out under a pressure of 80 pounds, drenched the plane and its pilots and they came down.

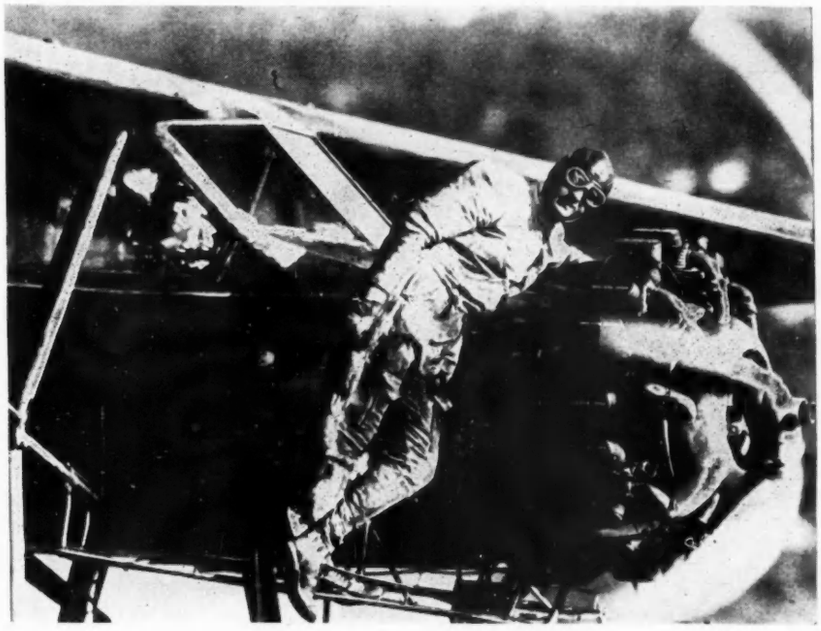
The Wright J-6 300 horsepower motor was still turning over when John Hunter cut the switch, after the Stinson-Detroiter had taxied up to the hangar.

Chrysler Appoints Moock to Head Used Car Sales

DETROIT, July 7—Harry G. Moock, formerly director of merchandising of the Motor and Equipment Association, has been appointed director of used car activities of all divisions of Chrysler Motors, according to an announcement by J. E. Fields, vice-president in charge of sales of the Chrysler Corp. Used car sales under Mr. Moock's direction will be expanded through a central division instead of by separate sales divisions as in the past.

Harry G. Moock

Mr. Moock has served as retail salesman, dealer and distributor, secretary of the Denver Automobile Dealer Association and the Rocky Mountain Automobile Trade Association. In 1917 he became secretary-manager of the National Automobile Dealers' Association, serving in that capacity until 1922, when he joined the Hudson Motor Car Co. Six months later he was appointed sales manager, a position he held until 1927.



Repairs Over Sky Harbor

Kenneth Hunter, one of the two brothers who broke the world's record for sustained flight in an airplane, inspects the rocker arm lubrication of his engine from an improvised catwalk while the plane "City of Chicago" is in midair

Crude Rubber Quiet

NEW YORK, July 7—Trading in the crude rubber market was comparatively quiet last week with prices ranging fairly steady, according to F. R. Henderson Corp.

Gross exports from Malaya during June were placed at 36,657 tons, as compared with 49,039 tons during May, the decrease being attributed to the tapping holiday during May.

Consumption in the United States during June is estimated at 35,000 tons with probable consumption for July placed at 3000 tons less.

Arrivals at all ports during June are now placed at 40,375 tons.

Stocks in London increased to 79,699 tons and Liverpool stocks increased to 27,493 tons.

Plan National Truck Meeting

NEW YORK, July 7—Truck Association Executives of America and the truck department of the National Automobile Chamber of Commerce have called a meeting of managers and officers of truck associations to be held at the Hotel Ansonia in New York Wednesday, July 16, and Thursday, July 17. These meetings are open to any officers, members or employees of truck associations who are interested in association problems.

Cadillac Takes Ohio Outlet

CLEVELAND, July 7—Thomas H. Towell, president of the Towell Cadillac Co., and for the past 19 years distributor of Cadillac cars in the northern Ohio district, has resigned and the Cadillac Motor Car Co. has taken over management of the local branch.

Bruce E. Adams, who has been a regional manager in the Midwest since the expansion of the Cadillac field organization last fall, will be in active charge of the local branch, succeeding Towell, according to announcement of Lawrence P. Fisher, president of the Cadillac Motor Car Co.

Plan Segrave Memorial

LONDON, June 27—A trophy to be known as the Segrave Award for issue annually to the subject of Great Britain who best demonstrates the possibilities of travel by land, air or water is proposed by the Earl of Brecknock, and others prominent in English sporting affairs. The award is designed to serve as a memorial to Sir Henry Segrave, who lost his life June 13 after breaking the world's record for speedboats. Popular subscription to the project is being sought, and the extent of the support will determine the character of the award.

G.E. Has Engine Oil Heater Unit

NEW YORK, July 7—General Electric Co. has perfected a single-heat portable immersion heater for warming engine oil in airplane motors. This unit is designated Y-2839 and is planned to preheat the oil preparatory to starting the engine. The engine is rated at 750 watts and operates on 110-volt circuits, either alternating or direct current.

Urges Interest in Highways

NEW YORK, July 7—The National Automobile Chamber of Commerce is urging automotive men to take out temporary memberships in the Sixth International Road Congress which is to be held in Washington, Oct. 6 to 11, in order that they may participate in these meetings.

The Winners at Le Mans

Glen Kidston and Woolf Barnato relax after driving their Bentley to win the Grand Prix and Rudge-Whitworth Cup. Insert shows the Bentley nearing the finish

Chrysler Cuts Salaries Throughout Organization

DETROIT, July 7—In connection with a ten per cent cut in salaries which has just been put into effect, the Chrysler Corp. has made the following statement:

"The ten per cent reduction of all salaries which Chrysler Corp. has made is consistent with a retrenchment policy which the current depression in business demands. Labor has already contributed substantially through reduced working hours, and it was felt to be only fair that salaried employees should also bear some of the burden. The reduction applies to all salaried employees uniformly from Mr. Chrysler down. It is a tribute to the morale and loyalty of the organization that the advisability of this move has been generally recognized and cheerfully accepted.

"The Chrysler organization is determined to operate its business on a profitable basis under whatever conditions may exist, and the readiness to make all necessary sacrifices as indicated by this move is a factor of strength which is bound to be reflected in the ultimate success of the company and its continued progress in the automobile industry."

Plymouth Offering Prizes

DETROIT, July 7—The Plymouth Motor Corp. is sponsoring a contest in which it will award 1011 prizes to winners of a short essay on "Why I'd Buy a Plymouth." The first prize will be $1,000 a year for life. The next five winners will be given a trip around the world. There will be five cash prizes of $1,000 each and 25 Plymouth cars will be awarded. The 970 remaining prizes will be cash awards of $500 down. The story of the contest will be broadcast over a network of 172 stations, 6 days a week for 13 weeks, according to F. L. Rockelman, president of the Plymouth Motor Corp.

Houdaille Earnings Improve

CHICAGO, July 7—The Houdaille-Hershey Corp. in the quarter ended June 30, based on preliminary estimates, earned more than sufficient to cover the dividend requirements of 62½ cents a share on the class A stock and 30 cents a share on the class B stock for that period, it was stated July 1, by Claire L. Barnes, president of the company. This would indicate an improvement in earnings over the first quarter, although considerable less than in the corresponding months of 1929.

Illinois Truckmen Associate

CHICAGO, July 7—The motor truck operators groups of Illinois have organized under the name of the Allied Motor Truck Interests of Illinois, which they describe as a statewide council of associations interested in the operation of commercial motor vehicles, according to announcement yesterday. S. U. Hooper, vice-president of Hartman's Furniture and Carpet Company, heads the new federation. The association will unify the operators' interests as to legislation, taxation, safety and the furtherance of public good will.

Wayne Earnings Increase

CHICAGO, July 7—W. M. Griffin, president of the Wayne Pump Co., announces that earnings in the first half of the fiscal year were slightly in excess over the same period last year.

Kidston and Barnato Win Rudge-Whitworth Race

Non-Supercharged Bentley Premier Car in 24 Hr. Event

PARIS, June 23 (*By mail*)—Driving 1821 miles in 24 hr., Glen Kidston and Woolf Barnato won the Rudge-Whitworth Cup at Le Mans yesterday with a six-cylinder non-supercharged Bentley car having a piston displacement of 6507 cc. The race was run on the road, for cars carrying full touring equipment and ballast equivalent to the full load of passengers. This is the fourth consecutive win by Bentley, and the average of 75.6 miles per hr. is the highest ever attained on the road for this distance.

Two Stutz cars, driven by Brisson and Rigal and Philippe De Rothschild and Bouriat were among the competitors. After six hours running, when lying in fifth position, the Stutz driven by Rigal took fire and was completely consumed. This accident was due to the exhaust pipe having been torn off earlier when Rigal left the road. A little later the second Stutz went out with a broken rear axle. The cars used in this race had two overhead camshafts and four valves per cylinder, but were not supercharged.

Reo Honors Mrs. Holt

LANSING, July 7—Jessie M. Holt, assistant advertising manager of the Reo Motor Car Co., was recently presented with a diamond pin commemorating the fifteenth anniversary of her connection with Reo.

Mrs. J. M. Holt

Mrs. Holt has a wide acquaintance, not only throughout the Reo organization, both domestic and overseas, but also among the publishers of magazines and newspapers in the United States and abroad.

Shipment Decline Seen

WASHINGTON, July 10—Shipments of automobiles, trucks and parts during July, August and September of the current year will require 187,073 cars, or 25.3 per cent less than the 250,490 cars required during the corresponding quarter of 1929, according to estimates made by the Shippers' Regional Advisory Boards and made public by the American Railway Association.

Cessna Experiments Completed

CHICAGO, July 7—Recent experimental flights with a Cessna cabin-built plane, powered with a 240 horsepower Wright engine, showed the ship could cover eleven and one-half miles on one gallon of gas. More than 16,000 miles were covered in the experiments with fuel and lubricating oil.

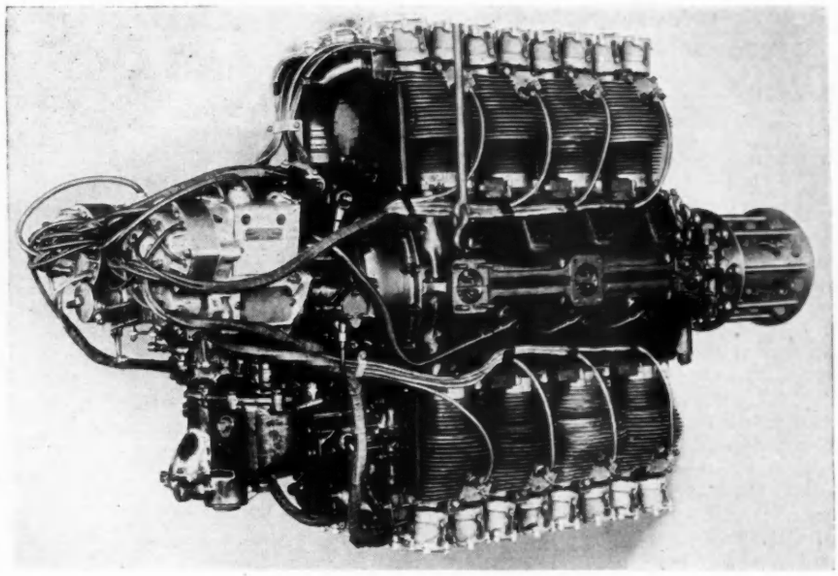
Air Ministry Describes New Napier Engine

Has 16 Cylinders in H-Shaped Formation

LONDON, June 24 (*By mail*)—The British Air Ministry has just released for publication brief particulars of a new air-cooled Napier airplane engine embodying a novel arrangement of cylinders. There are 16 of the latter with pushrod operated overhead valves, and they are arranged in four rows, two rows parallel above the crankcase and two parallel and inverted below it. It is therefore termed an H type engine.

The upright and inverted cylinders on each side of the centre line have a common crankshaft and the two crankshafts are geared to the shaft of the propeller boss. A supercharger is fitted and the engine is said to develop 300 b.hp. and to weigh 620 lb.

The chief advantage claimed for this design is that it offers a low wind resistance, and gives the pilot a particularly good view forward. It has for some months been undergoing tests in a new De Havilland plane.



New Type Napier Engine

Supercharged, this engine is claimed to develop 600 hp. for a weight of 620 lb.

Chevrolet Officials Confer With Dealers at Factory

DETROIT, July 7—The Chevrolet Motor Co. is conducting a series of conferences with its dealers on the national factory advertising program. A meeting with a different group of dealers is held once a month under the supervision of R. K. White, advertising manager. Each conference lasts two days. The first day is devoted to a discussion of advertising in all its phases with major interest attached to newspaper schedules. The second day the dealers are taken to the General Motors proving grounds to be shown Chevrolet tests.

Packard Delivers 4300

DETROIT, July 7—Packard Motor Car Co. reports that its June deliveries of new cars to customers, totaling 4300, exceeded any other June in the company's history. The best previous June was last year when deliveries totaled 4150.

Miniger Sees Assured Earnings

TOLEDO, July 7—Assured dividends for the shareholders of the Electric Auto-Lite Co. was pointed out to the owners of the company by C. O. Miniger, president, in a statement issued Tuesday. It was indicated that second quarter earnings will run at least $2.12 a share, which is an increase over the first quarter and the outlook for the third quarter is exceptionally good.

Biflex Closes Decatur Plant

DECATUR, ILL., July 7—The Biflex Products Co., R. F. Peterson, manager, manufacturing bumpers for motor vehicles, has closed. Bumpers will be manufactured in the future at the Detroit branch. When the plant is reopened in the fall, it will be devoted to the finishing of motor vehicle accessories of various kinds, to be determined later. The business was founded in Streator, Illinois, by L. P. Halladay, 10 years ago and transferred to Decatur five years ago. In 1928 the Biflex corporation purchased the plant, and expanded it at a cost of $50,000 one year ago.

Ford June Output is 174,528

DETROIT, July 7—World production of Ford cars and trucks during the first six months of the year totaled 995,226 according to an announcement by the Ford Motor Co. Production in June was 174,528 cars and trucks.

Italian Duty Does Not Concern Canada

MONTREAL, July 7—The increased tariffs on automobiles entering Italy will not injure Canada to any extent. Figures issued by the Department of Trade and Commerce, Ottawa, show that in the calendar year 1928 Canada exported 36 cars to Italy valued at $50,507, but that in 1929 only one car was exported and that valued at $2,800.

Plans Gold Cup Regatta

DETROIT, July 7—The 14th annual regatta of the Detroit Gold Cup Committee will be held from Aug. 29-Sept. 2 on the Detroit River. The feature event will be competition for the British International (Harmsworth) Trophy for speedboats. Several British and American entries have been received for this event, including that of Betty Carstairs, British woman pilot.

Chevrolet Using Unloading Dock

DETROIT, July 7—The recently completed dock of the Chevrolet Motor Co. at Saginaw, Mich., has been put into use for the unloading of pig iron and sand for use in the company foundry. It is 800 ft. long, of concrete construction and has a storage capacity of nearly 100,000 tons.

Army and Navy Aviation Awards Total 8 Millions

WASHINGTON, July 7—The Army Air Corps has just made contracts for 402 airplanes and 128 extra engines with spare parts, aggregating about $6,000,000. The Navy has awarded a contract to the Wright Aeronautical Corp., Paterson, N. J., for 272 air-cooled engines, totaling $2,030, 930.90.

The army contracts consisted of 71 Thomas-Morse planes, Consolidated Aircraft Corp., Buffalo, N. Y., $1,018,126.20; 44 Douglas planes and 146 basic training planes, Douglas Co., Santa Monica, Calif., $2,221,623.50; 131 pursuit planes, Boeing Airplane Co., Seattle, Wash., $1,543,183.90; 10 amphibon planes, Sikorsky Aviation Corp., Bridgeport, Conn., $437,832.65 and 128 aircraft engines with spare parts to the Wright Aeronautical Corp.

Loops Old Beachey Plane

CHICAGO, July 7—Dale "Red" Jackson, former coholder of the endurance flight record, was forced to land his old 1910 Beachey type Curtiss pusher aircraft in a cornfield July 4 after he had flown it over Grant Park and put it through 3 loops in the old Beachey fashion. A leaky water jacket forced him down.

Cords Win Prizes

HILSERUM, HOLLAND, July 7 (*By cable*)—Three Cord front-drive cars, all standard models, have been awarded first prize in beauty contests at the Concourse D'Elegance of the Royal Automobile Club of Netherlands at Hilserum, held here. A fourth Cord was awarded a second prize.

Mohawk Passes Dividend

CHICAGO, July 7—Dividends of the Mohawk Rubber Company were passed last week.

Car Dealers' Experience Good on Returned Items

Credit Survey Shows it Next to Best

WASHINGTON, July 7—Automobile dealers, with an average of 4.2 per cent, reported the next to lowest returns and allowances on instalment credit sales, according to the national retail credit survey recently completed by the Department of Commerce. The third lowest, 5.1 per cent, was reported by automobile-accessory stores. The average returns and allowances was 12 per cent of the total instalment credit sales.

Out of a total of 580 automobile dealers reporting, 85.1 per cent use open credit and 98.6 per cent use instalment credit. Of 1404 automobile accessory stores reporting, 80.1 per cent use open credit and 10.1 per cent use instalment credit. Of the total 35,257 reports received 74.1 per cent of the stores use open credit and 18.7 per cent use instalment credit.

Illinois Sales Decrease

CHICAGO, July 7—Reports on new car sales in Illinois for the first six months of 1930 show a decrease of 28,406 new cars, as compared with the same period in 1929, according to figures issued last week by the Illinois Chamber of Commerce. Sales for June, 1930, were 16,339 cars, a decrease of 6707 when compared with May, 1930, and 6745 fewer than for June of a year ago. Total car sales for the first six months' period in 1930 were 108,973, as compared to 114,193 for the corresponding period in 1929.

Roy von Domarus

CHICAGO, July 7—Roy von Domarus, district representative for the General Motors Truck Corp., died last week in the home of his mother, Mrs. Anna von Domarus.

California Gasoline Prices Cut

SACRAMENTO, CALIF., July 7—Gasoline was retailing at 10 to 12 cents a gallon at independent service stations here today while regular dealers charged 13 cents. The reduction represented a 1-cent cut from yesterday's prices. Elsewhere in California the quotations including the 3-cent state tax are 12 to 17 cents.

Louisville Sales Decrease

LOUISVILLE, July 7—June registrations of new passenger cars in Jefferson County (Louisville), Ky., were 46 per cent under the same month in 1929. For the first six months of this year, registrations show a decline of 31 per cent from the first half of last year.

Aeronautic Meeting Date Announced

CHICAGO, July 7—The Society of Automotive Engineers, in accordance with its annual custom, will hold its national areonautic meeting in Chicago this summer, coincident with the national air races, August 26, 27 and 28.

+ + CALENDAR + + OF COMING EVENTS

SHOWS

Posen, Poland, International Transport and Touring Exposition. June 29-July 13
Warsaw, Poland, International Transportation Exposition begins July 6
Detroit, All-American Air Derby, starts, July 21
New York, International Import Trade Exposition ..... Aug. 4-9
Lwow, Poland, Sample Fair ..... September
London, England, Olympia Show... October
Berlin, International Automobile.. Nov. 6-16

CONVENTIONS

Society of Automotive Engineers, Aeronautical, Chicago ..... Aug. 26-28
Eastern States Exposition, Springfield, Mass. ..... Sept. 14-20
National Safety Council, Annual Safety Congress, Pittsburgh.... Sept. 29-Oct. 4
Sixth International Road Congress, Washington, D. C. ..... Oct. 6-11
Exhibition—American Roadbuilders Association, Washington, D. C.... Oct. 6-11
Society of Automotive Engineers, Production, Book-Cadillac Hotel, Detroit ..... Oct. 7-8
Society of Automotive Engineers, Transportation, Pittsburgh ..... Oct. 22-24
Motor and Equipment Association, Convention, Cleveland ..... Nov. 10-14
N. S. P. A. Convention, Cleveland, Ohio, Nov. 17-21

SALONS

Chicago, Drake Hotel ..... Nov. 8-15
New York, Commodore Hotel. Nov. 30-Dec. 6
Paris, France ..... Oct. 2-12
Prague, Czechoslovakia ..... October
Paris, France, Salon (Commercial Vehicles) ..... Nov. 13-23
Brussels, Belgium, Salon ..... Dec. 6-17

RACES

Belgium ..... July 5-6
Germany (Grand Prix) ..... July 13
Belgium (European Grand Prix).... July 20
Berlin, International Light Airplane Tour, starts ..... July 20
Spain ..... July 27
Chicago, Air Races ..... Aug. 23-Sept. 1
Italy (Grand Prix) ..... Sept. 7
France (Grand Prix) ..... Sept. 21

Buys National Tire Option

EAST PALESTINE, OHIO, July 7—C. E. Seigfried of Akron, Ohio, has taken an option of the real estate, buildings, chattels, patents and inventions of the National Tire and Rubber Co., at a set price of $45,000. The option expires August 8, although the instrument filed with the county recorder shows that it can be renewed at intervals of 30 days.

Mr. Seigfried indicates that the option will be exercised and that the plant will be in operation within a short time. It is understood that a syndicate of Akron men are backing the venture.

Cadillac Wins Vienna Event

DETROIT, July 7—The Cadillac V-16 has won the "Concours d'Elegance" at Vienna according to Cadillac officials. First prize was awarded to a V-16 phaeton, with a special Fleetwood body, the entry of the Baroness Von Rosenberg.

Iowa Tax Revenue Increases

DES MOINES, IOWA, July 9—Gasoline tax collections in Iowa in the fiscal year ended June 30, increased nearly $2,000,000 over the previous period, according to Ray E. Johnson, state treasurer.

D. A. C. Sales Increase

DETROIT, July 7—The Detroit Aircraft Corp. reports gross sales amounting to $972,000 during June. Sales in June were $728,000 greater than the total of the previous month.

Taxicabs With Shorter Wheelbase are Predicted

Chicago Operators Studying Possibilities of Adoption

CHICAGO, July 8—Possibility that taxicabs in the future may be built with a short wheelbase resulting in a motor under the driver's seat is being studied by Chicago taxicab executives.

Thomas Hogan, vice-president and general manager of the Yellow Cab Co., stated that although his company has just finished junking 1063 cars of an average age of three years and worth approximately $750,000, because the customers demanded larger vehicles, he felt that the taxicab of the future must necessarily be small.

Robert E. McLaughlin, president of the Checker Taxi Co., said that his company had already placed orders for the delivery of large cars for the next five years, but admitted that his company might be compelled before that period has expired to operate taxicabs of a much shorter wheelbase.

Gasoline Stocks High

WASHINGTON, July 7—Stocks of gasoline in storage in the United States decreased by only 289,000 barrels in May, compared with a decrease of 804,000 in April and of 2,367,000 in May of last year, the United States Bureau of Mines has reported.

The stocks at the end of May totaled 54,046,000 barrels, compared with 54,435,000 at the end of April and with 44,648,000 at the close of May, 1929.

Clarence W. Dickerson

DETROIT, July 7—Funeral services for Clarence W. Dickerson, 70 years old, vice-president and secretary of Timken Detroit Axle Co., who died last Tuesday morning after a week's illness of heart disease, were held last Thursday in the First Presbyterian Church, Detroit. Burial service was held in Chicago Saturday. Mr. Dickerson came to Detroit in 1910, as assistant treasurer of the Timken Company. At the time of his death he was also a vice-president and director of the Michigan Mutual Liability Company, and a director of the Michigan Industrial Bank.

To Establish Engine Testing Branch

WASHINGTON, July 8—A branch office of the Engineering Section of the Aeronautics Branch, Department of Commerce, will be established at Los Angeles, California, in order to expedite the examination and approval of designs of aircraft types, Gilbert G. Budwig, director of air regulation, announced today.

Plans Highway Extension

SAINT JOHN, N. B., July 7—The New Brunswick elections are over and the Baxter Government is committed to the expenditure of $10,000,000 over a period of 5 years on hard surface roads. Experts are being secured to advise on the kind of roads suitable for this province.